

TERRA

THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

VOL. 23, NO. 4 • MARCH/APRIL 1985



CURATORS & COLLECTIONS

NATIONAL SCIENCE FOUNDATION COLLECTION IMPROVEMENT GRANT AWARDED MUSEUM'S ENTOMOLOGY SECTION

Dr. Charles Hogue, Entomology Section Head, is pleased to announce an award to the Section in November 1984 of \$165,000 from the National Science Foundation, Biological Research Resources Program. As principal investigator, Hogue will use the funds to implement a three-year plan for the improvement of the insect collections.

Technical personnel will be hired and supplies acquired for some long-needed and important curatorial projects. Foremost of these is completing the transfer of the moth collection from outmoded storage boxes to more than three thousand new glass-topped drawers purchased with grant money. Important research collections of tropical moths will be prepared for study, and the museum's entire representation of these insects will be organized and integrated into a unified series for the first time. This aspect of the project will be coordinated by Julian P. Donahue, Lepidoptera curator. Three very large and scientifically significant recent accessions of ant specimens (see *TERRA*, Curators & Collections, "Entomologists on the Move," January/February 1984), will also be curated, under the direction of Roy R. Snelling.

The collection improvement grant also provides funds for organizing and making available for study special collections of insects from the California Channel Islands and ectoparasitic mites from Costa Rican mammals. Some grant funds will be used to support visits to the museum by specialists from other institutions, who will aid in the project.

ENCHANTRESS CHARTS TROPICAL SEABIRDS IN WAKE OF EL NIÑO

During May and June of 1984, Kimball L. Garrett, Collections Manager in Ornithology, sailed from Panama to French Polynesia, conducting over three hundred seabird transects (a straight-line census of birds taken at fifteen-minute intervals) to establish a baseline of distributional and foraging data following the 1982-83 El Niño event. Traveling aboard the *Enchantress*, a forty-seven-

foot ketch owned and skippered by Richard Kelton of Los Angeles, Garrett obtained data for fifty-two species of seabirds, many of which are poorly studied away from their breeding grounds. These data are being analyzed in conjunction with sea surface temperatures and other physical data collected during the voyage.

Research by Dr. Ralph W. Schreiber, Curator of Ornithology, and Elizabeth Anne Schreiber, Research Associate, has demonstrated profound breeding failures in a wide range of seabird species that nest on islands in the tropical Pacific Ocean (see *Science*, 17 August 1984, pp. 713-716). El Niño, the warm water event that was particularly pronounced in 1982-83, has been clearly implicated in these nesting failures. However, until the *Enchantress* voyage, the effects of this oceanographic/atmospheric anomaly on the distribution and feeding behavior of seabirds well away from their breeding islands had been little studied.

The expedition, which was also joined by entomologists G. Allan Samuelson and Gordon Nishida of the B. P. Bishop Museum in Honolulu, included stops in the Galapagos Islands, the Marquesas Islands (Hiva Oa, Ua Pou, and Nuku Hiva), and the Tuamotu Archipelago (Takarua and Arutua Atolls). Work in the latter two island groups included observations on the Marquesan and Tahitian Lorikeets, small parrots that are listed in the Red Data Book of threatened and endangered bird species, and the Marquesan Reed-Warbler, a small passerine closely related to the Christmas Island Warbler currently under study by Dr. Schreiber and Research Associate Sharon L. Milder.

CORRECTION

An error was made in the editing of the article "Plants Against Cancer" by William A. Emboden in the January/February 1985 issue (volume 23, number 3). The author's photograph of the pink periwinkle *Catharanthus roseus*, a plant with extracts that have proven particularly effective in treating children suffering from acute lymphocytic leukemia, was replaced with a photograph of a relative, the blue periwinkle *Vinca major*, which is not known to have cancer-treating properties. We apologize to Dr. Emboden for this mistake.



TERRA

THE MEMBERS' MAGAZINE
OF THE NATURAL HISTORY MUSEUM
OF LOS ANGELES COUNTY
AND THE PAGE MUSEUM
OF LA BREA DISCOVERIES

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COVER

Cordmarked and appliquéd infant burial jar ca. 2000 to 1500 B.C. from Ban Chiang. During the early period (ca. 3600 to 1000 B.C.) infant skeletons were found buried in large jars such as this one.

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BAN CHIANG

DISCOVERY OF A LOST BRONZE AGE

by JOYCE C. WHITE

In 1966 Stephen Young, a Harvard junior and son of a former American ambassador to Thailand, tripped over a tree root in Ban Chiang, a village in northeastern Thailand, and fell face down on some unglazed pottery painted with sophisticated swirling designs. He took some samples back to Bangkok and showed them to persons knowledgeable about ancient Thai culture. The pottery did not resemble any known prehistoric examples, so the Thai Fine Arts Department sent a sample sherd to the Museum Applied Science Center for Archaeology (MASCA) at the University of Pennsylvania for dating by the newly developed thermoluminescence technique. As the pottery was reportedly associated with bronze objects, archaeologists expected it to date from perhaps the middle of the first millennium B.C., the traditionally accepted time for the introduction of bronze into Southeast Asia. However, the thermoluminescence run produced a result of 4630 B.C.!

Ironically, this result has since proved grossly incorrect. When archaeologists Chester Gorman from the University Museum of the University of Pennsylvania and Pisit Charoenwongsa of the



Chester Gorman

Cover: Joan Broderick

Late period pottery (ca. 300 B.C. to A.D. 200) from Ban Chiang, northeast Thailand. The buff pottery painted with exquisite freehand designs brought initial renown to

Ban Chiang. However, these ceramics turned out to be the tip of the cultural iceberg when scientific excavations revealed many preceding cultural periods.

Recent archaeological research in northeast Thailand—a region long considered a cultural backwater of China and India—has revealed an indigenous and technologically precocious cultural tradition dating back five thousand years.

Bent tip bronze spearpoint and beaker pot from burial 76, Ban Chiang, date ca. 200 B.C. The socketed spearpoint is one of the oldest metal objects excavated from the site. Scientific analysis of the blade indicates that it was hammered and annealed to increase the strength of the edge.



Joan Broderick



Thai Fine Arts Department conducted systematic excavations at Ban Chiang in 1974 and 1975, the red on buff pottery of the type found by Stephen Young proved to date closer to 200 B.C. However, the painted pottery was found in the upper levels of the site and was merely the tip of the iceberg. Beneath lay many more layers containing other types of ceramics and bronzes—and the lowest levels produced dates in the mid-fourth millennium B.C.

Despite the initial misleading clue, recent archaeological research in northeast Thailand—a region long considered a cultural backwater of China and India—has revealed an indigenous and technologically precocious cultural tradition dating back five thousand years.

Ban Chiang: Discovery of a Lost Bronze Age, an exhibition based on this research, will be on display at the Los Angeles County Museum of Natural History from March 2, 1985, to May 31, 1985. The exhibition presents the clues that led to the discovery of the Ban Chiang cultural tradition including the oldest intact bronze artifact from northeast Thailand, a digging tool or axe/adz excavated in 1968 from Non Nok Tha, a site south of Ban Chiang. Also exhibited are the special research strategies employed by archaeologists and other specialists and their major findings to date. Life-size models, objects used in everyday life in the area today, photographs, diagrams, and artifacts recovered in the excavations allow the exhibition visitor



Chester Gorman

to experience the archaeological and cultural contexts of the artifacts on display as well as the research strategies used to decipher the ancient lifeways.

Most of the evidence for what we know of the way prehistoric Ban Chiang villagers lived has been derived from the human burials and accompanying grave goods, mostly pottery, excavated at the site. Specialist studies of the pottery, human and animal bones, rice impressions in the pottery, and the bronze and iron artifacts have revealed intriguing clues to the ancient lifestyle. The site of Ban Chiang was settled about 3600 B.C. by people who still collected much of their food from the wild. Yet they also raised domestic stock and probably practiced some simple form of rice cultivation. The water buffalo, which today's villagers use to plow rice paddies, was not used in Ban Chiang until around 1000 B.C.

Despite the simplicity of their economic strategies, the material culture of the ancient villagers indicates a remarkably advanced technology and a lively aesthetic sense. Even the oldest pottery unearthed at Ban Chiang displays the elegant proportions and stylistic treatments found throughout the tradition. The freehand curving line motifs that characterize Ban Chiang pottery were incised on some of the early period (ca. 3600 to 1000 B.C.) pots, incised and painted on some middle period (ca. 1000

Despite the simplicity of its economic strategy, the material culture of Ban Chiang indicates a remarkably advanced technology and a lively aesthetic sense.

Opposite page: Careful excavation of a burial at Ban Chiang. Systematic scientific excavation procedures were implemented, enabling the maximum retrieval of information.

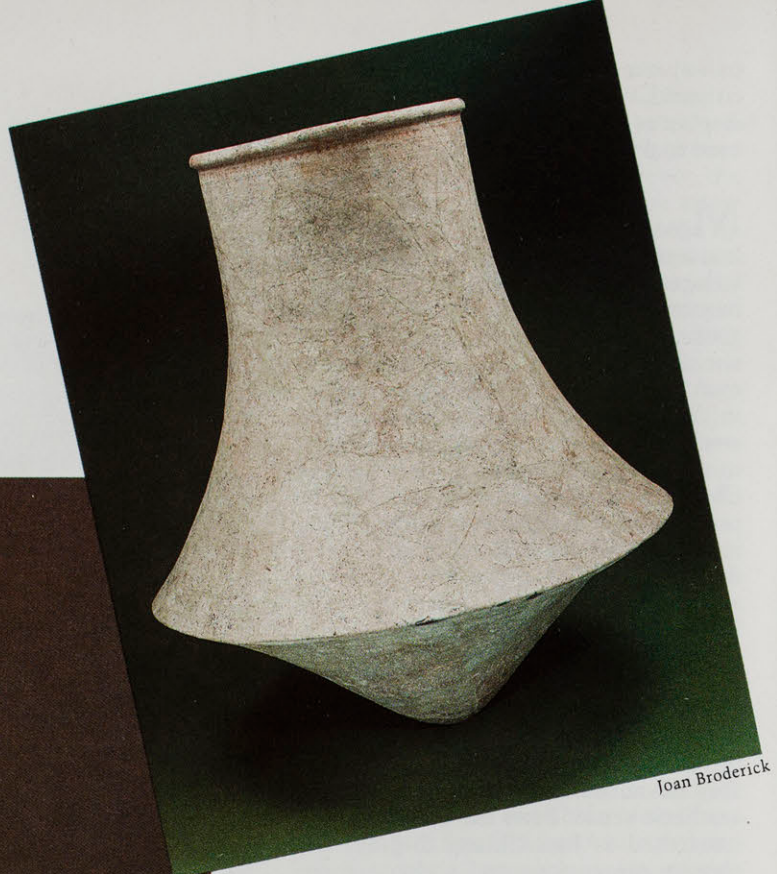
An incised and rocker-stamped black pot from the basal levels at Ban Chiang. Even the earliest pottery shows the elegant proportions and freehand curvilinear motifs that characterize the Ban Chiang aesthetic.



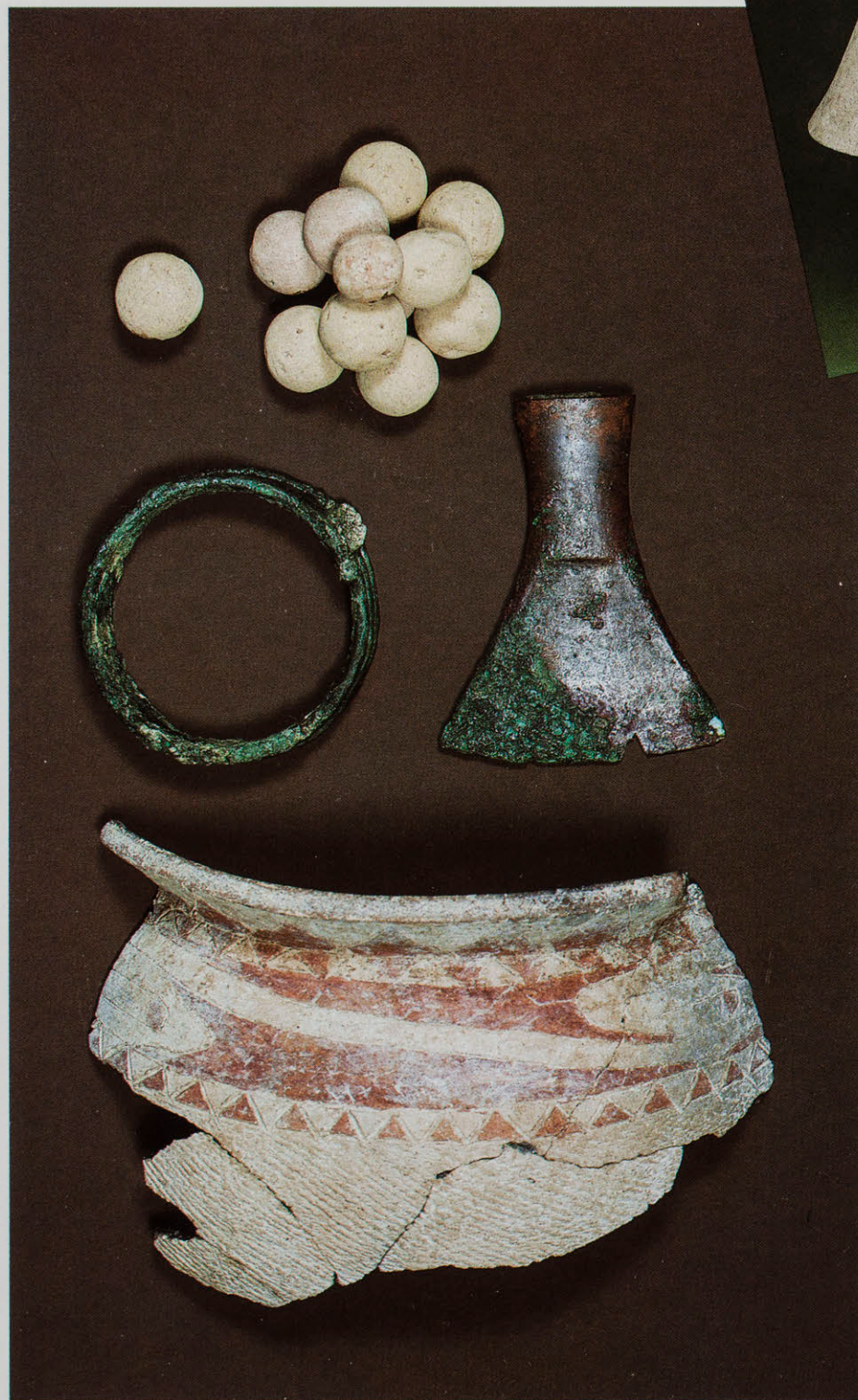
Joan Broderick

Even the oldest pottery unearthed at Ban Chiang displays the elegant proportions and stylistic treatments found throughout the tradition.

Grave goods from Vulcan included (clockwise from the top) over thirty baked clay pellets, a bronze socketed adz, a painted and incised pot fragment, and four bronze bangles. The clay pellets might have been used with a pellet bow such as the modern bow displayed in the exhibit.



Joan Broderick



Joan Broderick

to 300 B.C.) pots, culminating in the elaborate and varied designs painted on the late period (ca. 300 B.C. to A.D. 200) pots. Other ceramic treatments included burnishing, rockerstamping, appliqué, and the ubiquitous cordmarking.

That the villagers were skilled metalworkers is evident from the bronze socketed spearpoint discovered in a flexed burial of a young man that dates possibly from 2000 B.C. This well-made artifact shows in its bivalve (two piece) mold casting and hammered and annealed edge a developed understanding of bronze metallurgy well beyond the experimental stage. The tip of the spearpoint had been bent prior to interment and seems to be an early example of mutilating or "killing" objects placed with the deceased.

Life-size and scale models in the exhibit portray the funerary styles of the various periods. One fiberglass model shows a reconstruction of the early period grave of a middle-aged man buried around 1500 B.C. The man, nicknamed Vulcan by fieldworkers, wore bronze bracelets, had a socketed adz by his shoulder, a painted and incised pot at his feet, and a pile of baked clay pellets above his other shoulder. These pellets may have been projectiles for a pellet bow similar to an exhibited bow made by a current resident of a village near Ban Chiang.

An infant jar burial dating to about 2000 B.C. is also depicted in a life-size model. The seemingly high infant mortality of the early period (3600 to 1000

Opposite page: White carinated pot from the middle period (ca. 1000 to 300 B.C.), Ban Chiang. Pots such as these were found shattered over bodies, usually several pots per burial. The elegant forms were revealed only after months of reconstruction in the lab at the University Museum of the University of Pennsylvania.

Burial 23 was nicknamed Vulcan because of the four bronze bangles and bronze adz discovered in the grave. This burial is portrayed in one of the life-sized fiberglass models in the exhibit.



Chester Gorman

B.C.) may reflect a somewhat precarious subsistence base or perhaps even the practice of infanticide. Yet the attention to decorative detail found in this elaborately incised burial jar and other pottery on display from throughout the three-thousand-year ceramic sequence is far beyond the rudimentary needs of a subsistence society and suggests that ceramics were an artistic medium from the earliest occupation.

The funerary pottery of the middle period (1000 to 300 B.C.) included large and elegant carinated wares (pots with sharply keeled bodies). These were only discovered after careful excavation and months of sorting, fitting, and gluing thousands of sherds per burial. This was necessary because the ancient peoples shattered as many as eleven pots over each body. Middle period burials also contained the earliest forged iron objects from the site including a beautifully crafted iron blade with a cast-on bronze socket.

Late period burials (300 B.C. to A.D. 200) contained the classic red painted pottery as well as bronze bangles, iron tools, glass beads, and intriguingly carved baked clay rollers that were perhaps used to print textiles. A life-size model of the burial of a three-year-old child illustrates this period.

The most important contribution of the Ban Chiang excavations is the four-thousand-year view it gives archaeologists of the roots of the lowland rice-based agrarian society found throughout South-



Joan Broderick

The oldest intact bronze artifact in northeast Thailand, a digging tool or axe/adz excavated near Ban Chiang. Nicknamed WOST (World's Oldest Socketed Tool) by fieldworkers.

Surely a society with time and resources to make fragile ceramics and then break them over their dead was prosperous.



Clay rollers from the foot of burial 8. Carved baked clay rollers were found in the late period (ca. 300 B.C. to A.D. 200). Their use is a mystery, but some have suggested that they were used to print textiles.

Chester Gorman

Opposite page: Plowing paddy fields on the edge of Ban Chiang, north-east Thailand. Archaeological excavations at this village have revealed the roots of the rice agricultural lifestyle found throughout South-east Asia today.



Joan Broderick

One of the most beautiful of the late period (ca. 300 B.C. to A.D. 200) red on buff painted pots excavated at Ban Chiang. Notice the miscalculation in the lines crossed on the base of the pot.

Why did these peaceful agrarian villagers invest such care in their ceramics and so much exacting effort in their metals? Why did no urban civilization develop until much later in Southeast Asia?

Joyce C. White

east Asia today. Many practices fundamental to modern life in Thailand—such as rice cultivation, the raising of cattle, water buffalo, dogs, pigs, and chickens, and even pottery-manufacturing techniques—were present in some form thousands of years ago at sites of the Ban Chiang tradition. Despite this underlying ecological continuity, the diversity, individuality, and innovation of these ancient societies stand out, especially in their ceramic and metallurgy traditions.

Why did these peaceful agrarian villagers invest such care in their ceramics and so much exacting effort in their metals? Unlike other centers of early metallurgy in northern China and Mesopotamia, the early uses of metals in northeast Thailand were not for ceremonial vessels or military weaponry suitable for state functions, but were for items appropriate to village contexts—axes, spearpoints, and small personal ornaments. A society with time and resources to make fragile ceramics and then break them over their dead was surely prosperous. Why did no urban civilization develop until much later in Southeast Asia?

The pattern of cultural development in the area appears unusual, defying orthodox ideas that look to centers of high civilization for all major technological

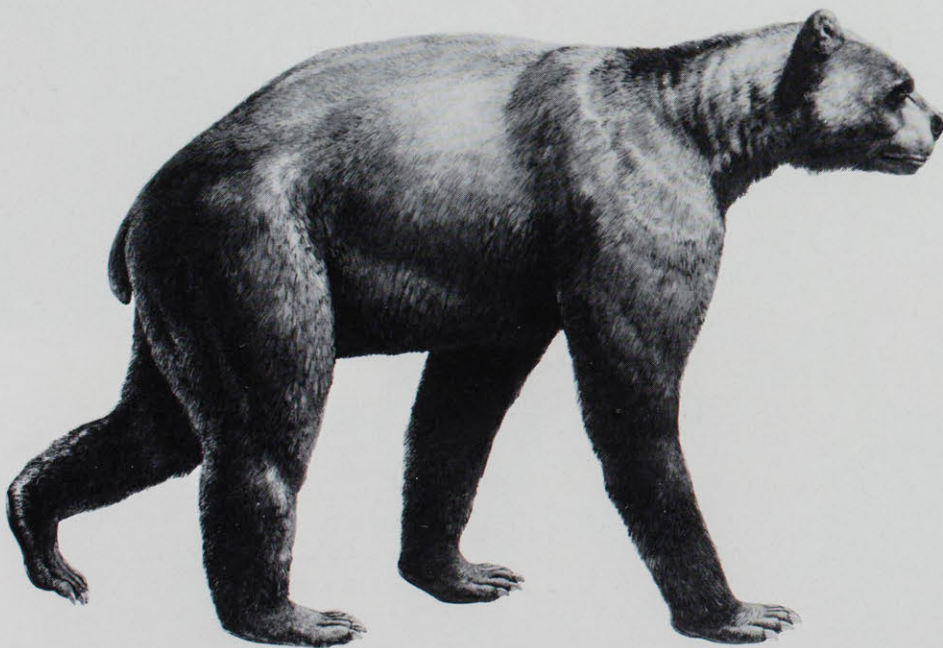
innovations. The questions raised by the excavations at Ban Chiang and related sites will take many more years of careful study to answer. The exhibit—Ban Chiang: Discovery of a Lost Bronze Age—is in many cases only able to point out the emerging enigmas, but in so doing it shows both the excitement and the frustrations of modern archaeological research.

Joyce White, Guest Curator of the Ban Chiang exhibit, is a Research Associate at the University Museum, University of Pennsylvania, where she is currently working on the technical analysis and publication of reports of Ban Chiang materials. She has been associated with the project for nearly ten years beginning as a volunteer in the laboratory analysis. She went to live in the village of Ban Chiang for twenty months between 1979 and 1981 and undertook ethno-ecological research in the contemporary village to assist in the reconstruction of the ancient diet and environment. Upon the death in June 1981 of Chester Gorman, co-director of the Ban Chiang excavations, Ms. White took on the curatorial aspects of the Ban Chiang exhibit, including organizing the presentation and writing and editing the exhibit text and catalog.



The Cave of Ancient Bears

by STEVEN D. EMSLIE



This reconstruction of a short-faced bear illustrates its characteristic short face and long legs. Some scientists believe that it was a powerful carnivore,

but it may actually have been primarily herbivorous. Painting by John D. Dawson.

Nevada is a state of few people but an abundance of beauty. Typical of the Great Basin, Nevada consists of numerous north-south-trending mountain ranges of uplifted limestones and basalts. Between each of these ranges are vast, open, sagebrush-covered valleys that once contained lakes during the wetter periods of the Pleistocene epoch, over ten thousand years ago. Today, gravel terraces and beach sand dunes, remnants of these large lakes, are still evident.

Because limestone permeates these Nevada mountains, many caves have formed within them, particularly near springs. These caves have attracted speleologists to Nevada for years, and local speleological societies are actively involved in locating, mapping, and protecting many of the caves. In January 1981, one such society in Ely, Nevada, the High Desert Grotto, made a most unusual and fascinating find.

That winter, Sam Baker, Dennis Hone, and Bob Swain, members of the High Desert Grotto, uncovered an opening to a newly discovered cave in the mountains near Ely. Springs in the area had given them the first clue to the cave's presence. Their diligent efforts proved that their guess had been correct. Because it took them three days of digging in freezing weather to uncover this opening, they named the cave "Labor-of-Love Cave."

When the High Desert Grotto first entered this small cave, which consisted of one main passage through which a stream flowed, they were enthralled by its beauty and its many unusual stalactites and stalagmites. But as they ventured deeper into the cave, they soon found something unexpected. Lying in a pool of water were many large bones, which they at first thought to be human. However, closer inspection revealed them to be the remains of a large carnivore, perhaps a bear. Farther into the cave they found more bones in another pool of water. Not wishing to disturb this unusual find, Sam and the others avoided these areas so they could be studied by a paleontologist. Fortunately Sam contacted a friend of mine in Ely who knew I studied fossils. It was in this manner that I was to become involved with the collection and analysis of these bones as a Field Associate in Vertebrate Paleontology of the Los Angeles County Museum of Natural History.

To collect fossils at Labor-of-Love Cave, I first needed a scientific collecting permit from the U.S. Forest Service. The U.S.F.S. does not issue permits of this type to individuals unless they meet several requirements: they must place all specimens collected in a public repository of high standing, they must demonstrate expertise in collecting fossils, and they must provide a step-by-step procedure that will be implemented during

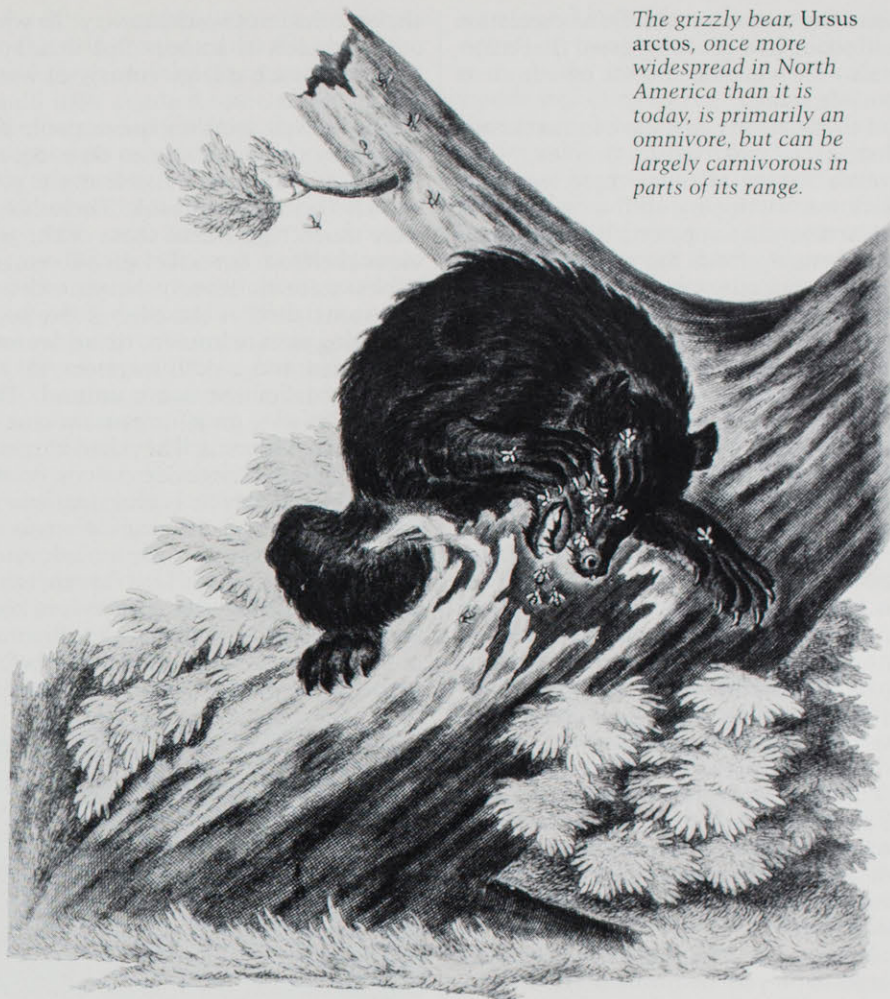
the collecting process. These requirements not only assure the accessibility of specimens to other scientists, they force the researcher to think the project out carefully prior to its initiation.

My affiliation with the Los Angeles County Museum was a great advantage in planning the removal of the bones from Labor-of-Love Cave. Not only does the museum have an excellent reputation as a professional organization, it provided the manpower and facilities I badly needed to complete the work. Once the U.S. Forest Service learned of the support the museum was providing me, the permit was readily granted. Now work could begin at the cave.

I first visited Labor-of-Love Cave with members of the High Desert Grotto in July 1982—high water levels from spring runoff prevented us from entering the cave any earlier. We needed protective clothing, or even wetsuits, to explore within the cave, since the wet and cold environment can cause hypothermia. We also needed hard hats to protect our heads from the many sharp rocks projecting from the low ceiling. Led by Dennis Hone and followed by Frank Johnson of the U.S. Forest Service, I dropped about twenty feet down a narrow shoot and slid into a pool of cold water before I could stand up in the first section of the cave. A small, shallow stream flowed toward me and disappeared underground at the point where I had just squeezed in. The largest part of the cave was approximately six feet high and four feet wide and extended upstream in a narrow, curving channel. On my left was the limestone wall of the cave, on my right a dirt wall. The roots of grasses and other plants hung from the dirt wall, indicating that the ground surface was not far above. This portion of the cave had probably been open to the outside at one time, but it is now covered by a talus slope of rock and dirt.

One of the first things I noticed as I stood up was the haze caused by my breath, which was not dissipated by air currents as it would have been in the open air on a cold winter day. Instead, it hung in the air like cigarette smoke, often obscuring my vision when we stood closely together. As I walked upstream the cave became narrower in some areas, then widened again in others, forcing me to crawl or squat most of the way as I moved forward. The dirt wall on my right soon gave way to limestone as I moved deeper into the mountain. I had not yet observed any cave formations and had only seen a few signs of animal life such as small rodent tracks (a wood rat?) and nest material. We presently found a wood rat skeleton, slightly scattered, lying on a mud embankment. I then crossed the stream several times and walked along limestone shelves—both gravel bars and deep mud banks

The grizzly bear, *Ursus arctos*, once more widespread in North America than it is today, is primarily an omnivore, but can be largely carnivorous in parts of its range.



The black bear, *Ursus americanus*, is found throughout North America today and is an omnivore.

lined the stream's route. Dead vegetation collecting in a pool suggested that materials were washing into the cave from an outside source.

I then saw my first cave formations—dozens of beautiful, slender “soda straws,” some of them three feet long, with water dripping off the ends; young stalactites that appeared like giant carrots hanging from the roof; and an incredible helictite (an irregular stalactite with branching convolutions) defying gravity as it grew sideways. Now I reached a quiet portion of the stream, where the water formed pools and where many of these formations were hanging from the roof. Dennis pointed to the pool ahead where the first bear skeleton was located. I moved forward slowly, dodging the fragile formations and trying not to cloud the water with fine silt. Through the clear water at a depth of about six inches I saw a group of bones lying in front of me: an ulna, radius, humerus, mandible, and some vertebrae. The mandible was definitely from a bear and appeared similar to modern black bears, an *Ursus* species. But how old was it? There was no way to tell at this point. The bones appeared to be secondarily deposited; that is, they were washed to this place from another location, probably nearby, where the animal had died and was first covered with sediment and preserved.

I moved past this point, keeping on the banks to prevent disturbances to the pool and its contents. After passing more gravel bars and cave formations, I came near the end of the cave, nearly 450 feet into the mountain. On my left, the stream was flowing rapidly into a deep hole, which explained why the water was so quiet behind me and why the bear

skeleton had not washed away. To what other hidden chambers did this hole lead, with such a large volume of water falling into it?

Ahead was another quiet pool, bypassed by the main stream flow. Again, large bear bones were visible in the pool and also on the mud bank. These bones were much bigger than those of the previous skeleton. Several of the submerged bones were delicately balanced on a limestone shelf at the edge of the pool: matching pairs of humeri, tibiae, femora, mandibles, and a skull fragment, all apparently from the same animal. The mandibles were an all-important clue to the bear's identity. They had distinct double fossae, or large depressions, on the outer surface, which is characteristic of short-faced bears of the genus *Arctodus*—bears that became extinct over ten thousand years ago! In fact, this character occurs in only one living species of bear, the Spectacled Bear (*Tremarctos ornatus*) of South America. But here lying before me were the perfectly preserved remains

of a bear that I knew had roamed the valleys of Nevada thousands of years ago.

How did the bones get here? Perhaps the bears had used the cave as a den and had died during hibernation, which the complete state of the remains suggests. As with the *Ursus* skeleton, the *Arctodus* bones appeared to have been secondarily deposited. In addition, the bones had not been there long, precariously balanced underwater on the slanted limestone shelf with little silt deposited around them. I found their possible origin farther back in the cave.



View from near Labor-of-Love Cave shows the large, open valleys that once contained Pleistocene lakes.



Steven D. Emslie

Here, at the side of the cave, stood the remnants of a silt bank. The exposed side of the bank showed cross-bedding of hundreds of thin layers of silt packed together so firmly that I first thought the bank was made of rock. These strata, typical of stream deposition, must have taken hundreds of years to form.

What did this deposit indicate? First, portions of the cave must have been filled with silt at one time. During this period animals may have been trapped and died in the cave. Silt buried the skeletons of the dead animals within a

few years, protecting them from decay. As the silt continued to fill the cave, pressure from the increased weight would have crushed some of the buried bone, particularly hollow skulls. In fact, we found no complete skulls in the cave, only fragments.

After hundreds of years of silt deposition, the cave underwent a drastic change. The stream was either diverted or broke through a new opening and began flowing differently through the cave. The swift current began to slice into the silt deposits and cut a channel deeply into the strata, destroying deposits that took centuries to form. Skeletons preserved in the strata were washed out along the banks of the stream. These events may have just recently occurred, perhaps within the last few hundred years. Before all was lost from this erosional event, the cave was discovered by members of the High Desert Grotto who immediately recognized the scientific value of this find.

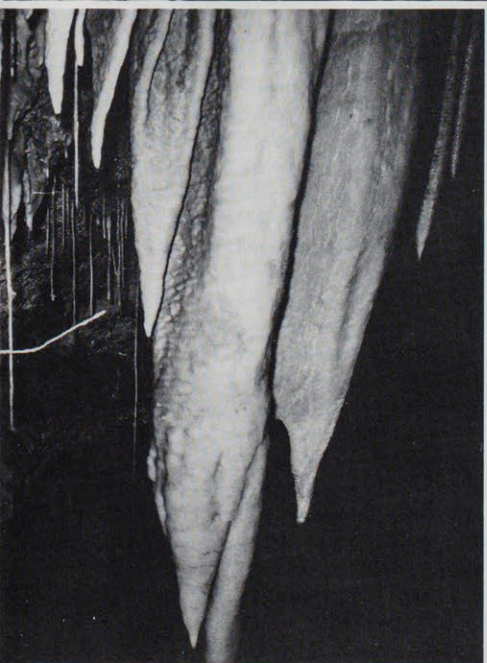
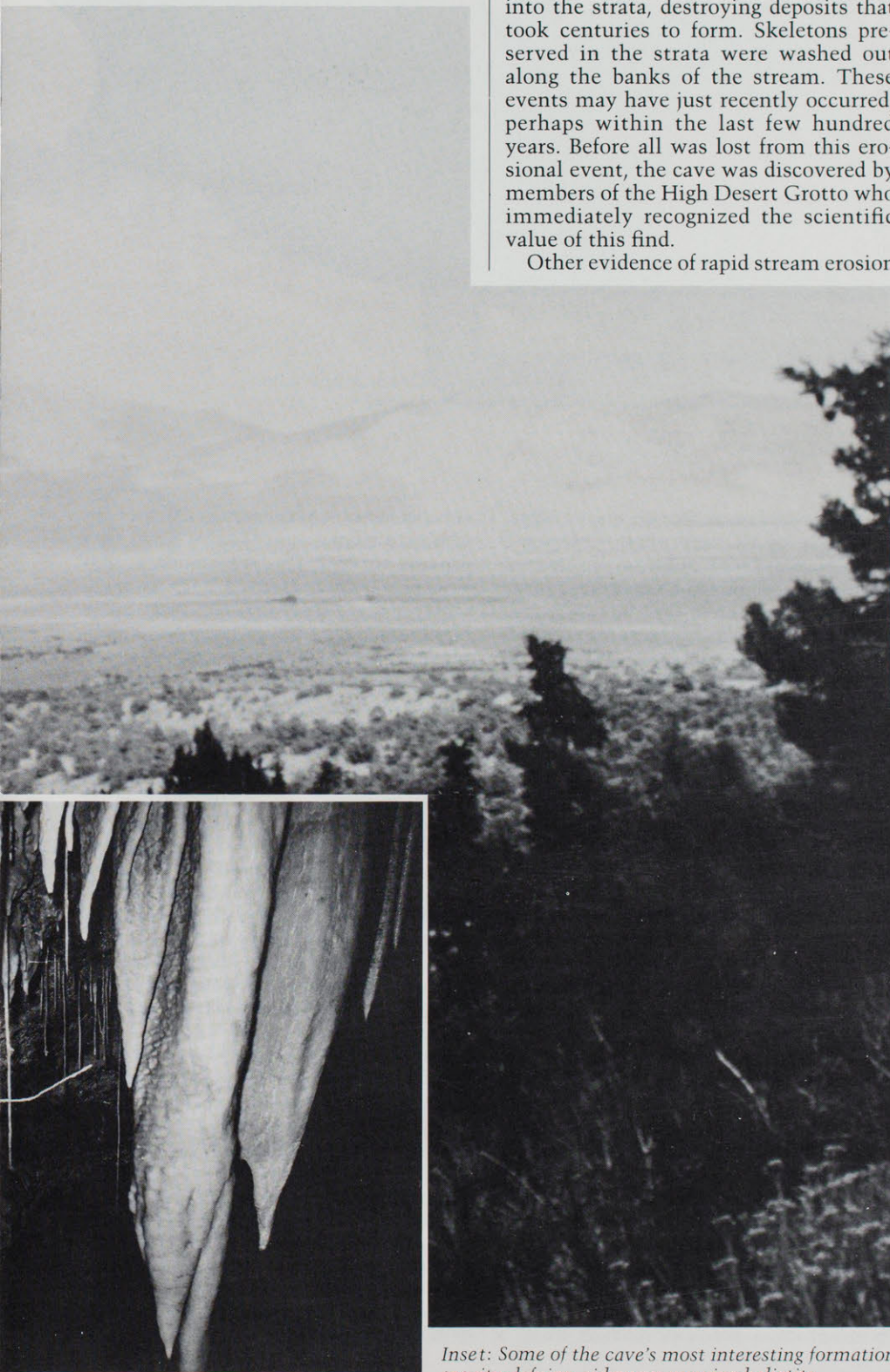
Other evidence of rapid stream erosion

was found throughout the cave. Additional silt banks were found along the route of the stream, and silt was often visible still clinging high on the walls of the cave. Sand and gravel bars, on closer inspection, appeared to contain hundreds of bones and fragments; bones washing from the banks would naturally deposit in these bars. Such a large amount of bone took longer than a few years to be deposited. How long has the stream been eroding the mud deposits? Can bones still be located in their original positions in the remaining strata?

As I stood outside the cave several hours later, wet, muddy, but exuberant, I was already planning the next steps in saving the bear skeletons, and other bones, for scientific study. This had to be done before the bones were washed away or removed by vandals. Within two weeks I had formulated a research design that outlined the specific procedures we would use to salvage the bones.

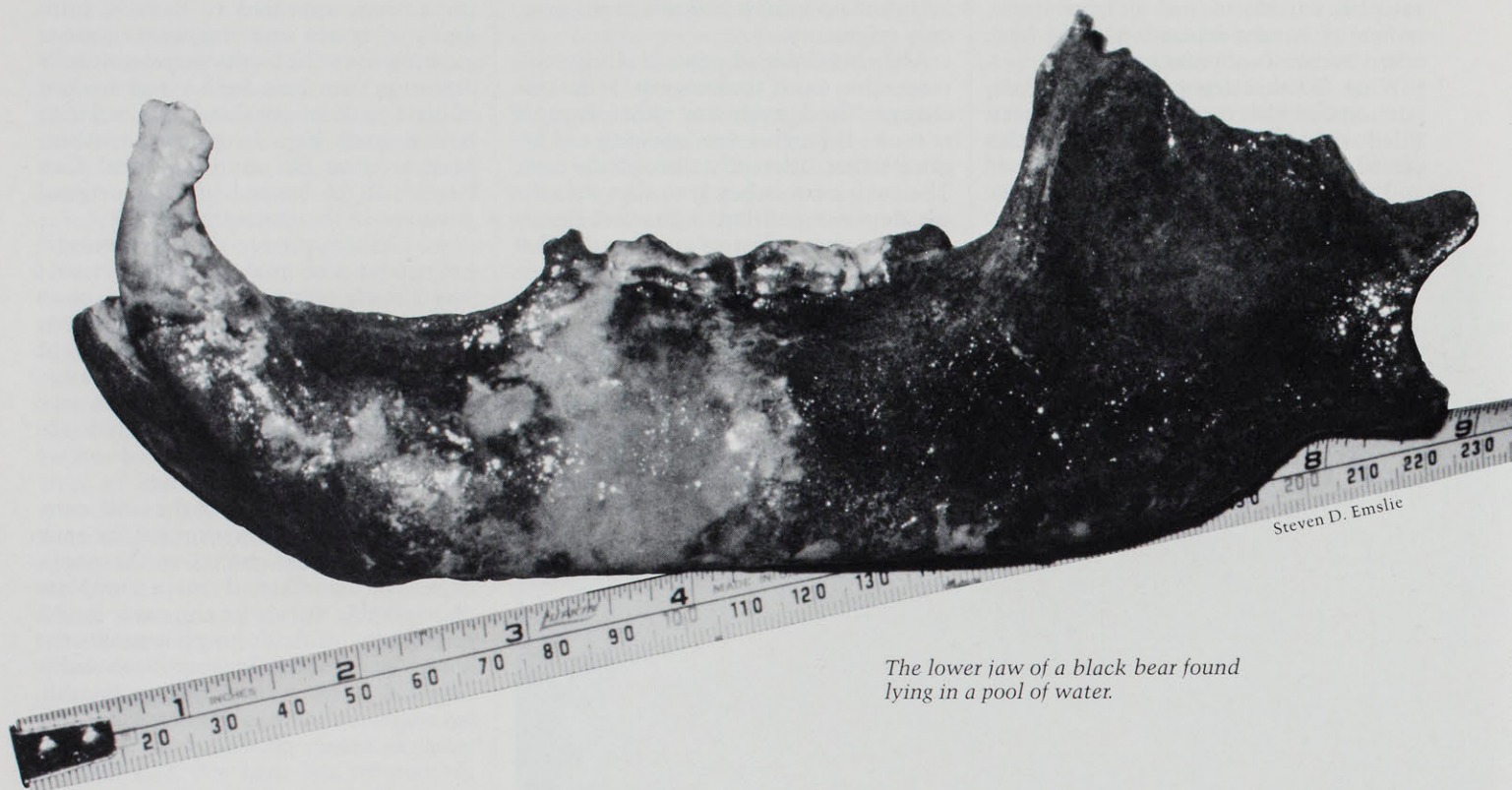
We spent another day in the cave, carefully mapping bones exposed in each pool using datum points at the pool's edge. We also carried out a complete photographic survey of the cave. It was particularly difficult to photograph the bones underwater because flash bulbs reflected off the water's surface. Instead, we angled indirect light sources into the water to obtain photos of the bones on the bottom and used 400 ASA film for the low light conditions. We were now ready to remove the bones.

On the first of August, 1982, twenty people turned out to help with the collection. The High Desert Grotto provided manpower to relay the bones out of the cave after they were carefully packed and labeled. Employees of the U.S. Forest Service and Bureau of Land Management



Inset: Some of the cave's most interesting formations—long, slender soda straws and an unusual, gravity-defying, sideways-growing helictite.

Steven D. Emslie



The lower jaw of a black bear found lying in a pool of water.

aided in repacking bones outside the cave and preparing them for transport to Los Angeles. I worked in the chilly cave environment for six hours removing each exposed bone. I carried out the last two long bones from the short-faced bear and was the last to leave the cave. When we were sure all was completed, Sam Baker sealed the small entrance to protect the cave from further disturbances.

The next day we shipped the bones to the Page Museum in Los Angeles for curation and analysis. It took a week for us to clean, preserve, and identify each specimen, but this seemingly drab task proved more interesting day by day. We found that we had the bones belonging to six bears, not two as we had first thought! The lower, downstream pool, which contained the scattered black bear skeleton, also produced one bone from another black bear, one bone from a short-faced bear not related to the skeleton upstream, and one bone possibly from the grizzly, *Ursus c.f. U. arctos*. The upstream pool contained the partial short-faced bear skeleton as well as several bones from another black bear not related to the bears downstream. Truly a cave of bears had been discovered!

The Labor-of-Love Cave finds proved important in many ways. One of the most complete skeletons of a single short-faced bear yet reported in North America had been recovered. Most other finds have consisted of only a few bones or

fragments of bones. Our specimen represented a small individual, perhaps a female, compared to those discovered previously. Pleistocene short-faced bears varied in size a great deal but were generally about one-third larger than a modern grizzly bear. Because short-faced bears had relatively long legs compared to other bears, and short, powerful jaws, it is believed that they were highly predaceous. Other explanations are equally possible, however. Though its jaw is short, it has an architecture more commonly found in herbivorous animals. In addition, though its legs were relatively long, they were not built for speed. Because of this, my associate Nicholas Czaplewski and I are currently investigating the possibility that this bear was primarily herbivorous—in contrast to modern bears, which are largely omnivorous.

Other interesting facts also emerged. The black bear bones found in the upper pool were directly associated with the short-faced bear. This is strong evidence that these species co-existed in Nevada during the Pleistocene. Similar evidence has been found at Rancho La Brea. Could one bear have preyed on the other? How did these species interact? More data are needed to answer these kinds of questions.

The single bone, possibly from a grizzly bear, *Ursus arctos*, was too fragmented to identify positively. However, it compared most closely with the same bone from a modern Kodiak bear, a

subspecies of *Ursus arctos*. Further investigations at Labor-of-Love Cave may provide more definitive evidence that this bear is represented here as well. Only one site in North America, Little Box Elder Cave in Wyoming, has a definite association of grizzly bear and short-faced bear in the same deposits. Since the grizzly bear migrated to North America in the late Pleistocene, some scientists believe it competed with the short-faced bear for food and habitat and may have helped cause the extinction of the latter species.

Labor-of-Love Cave has the potential to provide much information on the interaction of Pleistocene bears as well as other animals. A careful excavation into the existing strata in the cave is required and is planned in the near future. For now, the cave is again sealed as it has been for the last ten thousand years.

Steve Emslie is currently a Ph.D. candidate in vertebrate paleontology at the University of Florida, Gainesville. He received a Master's degree in biology from Northern Arizona University, Flagstaff, and has a keen interest in living and fossil birds as well as fossil bears. His work in Nevada has led him to other projects dealing with fossil assemblages from caves and how they are deposited. He is now working on fossil condors from caves in the Grand Canyon and in Florida.

"How's That For Salome!"

Some Dick Wick Prose and Poetry

by DONALD CHAPUT

Dick Wick Hall was a well-known promoter and writing-man in the West in the early part of this century. Although born in Iowa, he is always associated with the Arizona desert. He was a journalist for a time in Wickenburg, Arizona (where he picked up the "Wick" part of his name), but during most of the years from 1910 until his death in 1926, he promoted and publicized all kinds of land and mining schemes in the Southwest.

Despite what he felt was his true calling as a mining and land promoter, it was his journalistic efforts that for a few years in the 1920s made Dick Wick almost a household name. He had started a small, mimeographed newspaper in Salome, Arizona, loaded with weird drawings, strange poetry, and all kinds of exaggeration. Supposedly the newspaper's purpose was to divert and entertain travelers as they stopped for gas at Dick Wick's station in Salome. The Dick Wick style caught the attention of the *Saturday Evening Post*, and the *Salome Sun* and "Made with a laugh on a Mimeograph" soon became a regular feature in the *Post*.

Hall created a cast of regulars peculiar to the desert setting of western Arizona. First there was "Salome," the tall vixen, sometimes known as "Red Hot Mama." Others in the sandy cast included the Reptile Kid and Sheepdip Sam. Most famous was the Salome Frog, poor little

feller, who was never able to swim because of the lack of water in Salome. Hall used to close many of his letters with the phrase, "Yours, Until the Frog Learns to Swim."

Exaggeration and self-disparagement were Hall's humor guides, and they served him well. He was known to his contemporaries as a kindly man, desert-wise, humorous, friendly. Yet Hall's success as a literary figure was based on his background as one of the more interesting Western types, the promoter. From 1901, when he was on the staff of the *Wickenburg News-Herald*, until his death in 1926, Hall was just such a promoter. He dealt in gold, silver, or any other kind of mine; ranches in Arizona; oil fields in Alabama, Texas, and California. He was always on the verge of "hitting the big one," and he and his brother Ernest peddled mining and oil stock from California to Florida. The episode of the *Salome Sun*, in the 1920s, although the best-known chapter of his life, was merely a continuation for Hall in the business of pushing a project. If he wasn't selling livestock or mining stock, he was thinking of some scheme to part men from their money—in a friendly fashion.

The folksy musings reprinted in the *Saturday Evening Post* convinced the nation's readers that Dick Wick Hall was a man of the desert, happy in his lot, a good host, a simple, warm kind of fellow. The readers of the *Salome Sun*, fed on the

image of this frontier type, did not know that he was a dealer in land and oil in Alabama and California (in fact, for years Hall maintained a real estate office in Los Angeles and usually spent the summers there), or that he went to New York City to sell a gold mine for a million dollars. Hall was successful in convincing his contemporaries of his simple ways.

The Western promoter tilled many fields and used many devices. Some of these fellows were smooth-talking, buy-a-drink types, capable of convincing almost anyone to buy a few hundred shares of Wild Creek Oil. Other promoters were better with large crowds, in tents, or rented concert halls, where they could shout the glories of a new agricultural community, a silver bonanza, or oil fields just waiting to gush. Still other promoters earned their reputations and livelihoods from the written word, sponsoring enthusiastic newspaper and magazine advertisements or peddling books, pamphlets, and leaflets extolling the advantages of something or the other.

Dick Wick had several of these skills. He was not one for the crowds, probably because it was difficult to gather a crowd of anything in the Arizona desert. But in face-to-face encounters he was effective, capable of convincing even reluctant investors. He also had fair success while in Los Angeles, especially selling blocks of mining and oil company shares.

(Continued on page 18)

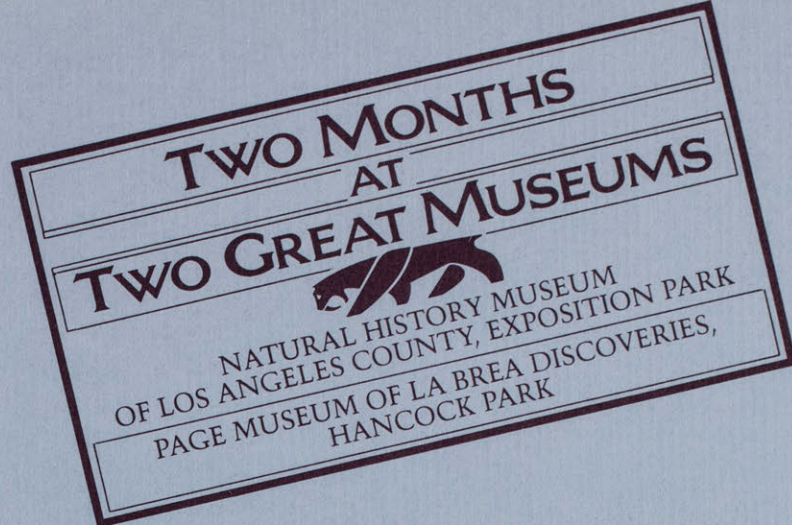
ALL ROADS LEAD TO

SALOME

AND THE

BIG STRIKE

Take the Santa Fe, Prescott & Phoenix to Wickenburg and the Arizona & California Railroad to Salome and from there to the big SALOME BONANZA by wagon, burros or afoot. Men are now at work building a good automobile road to the Bonanza Camp.



MARCH/ APRIL 1985

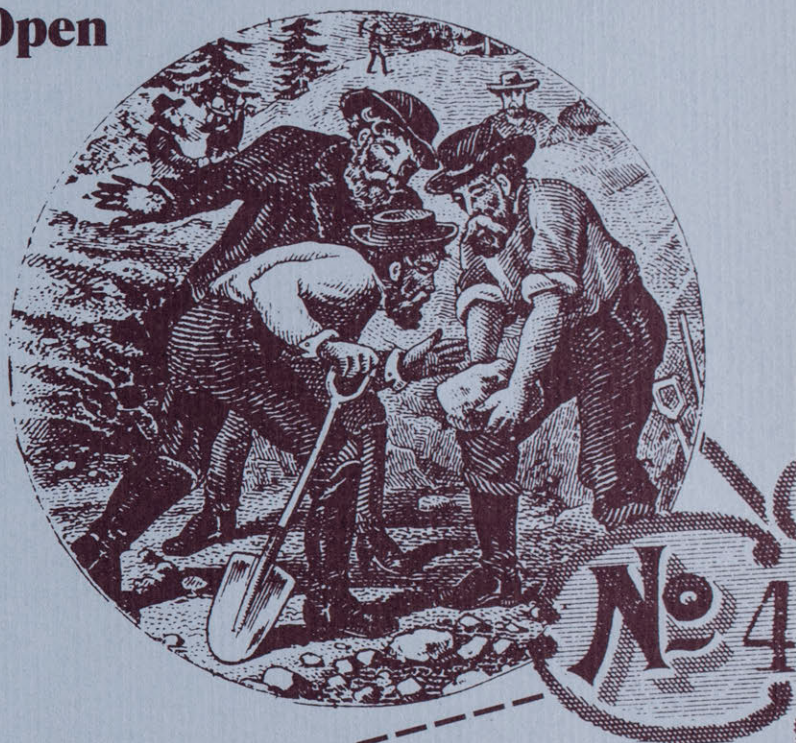
CALENDAR OF EVENTS

GEMSTONES AND THEIR ORIGINS

The Alex Deutsch Gallery to Open

The Alex Deutsch Gallery, a major permanent gem exhibit, is scheduled to open the first week in May. The exhibit will be located adjacent to the highly acclaimed E. Hadley Stuart, Jr., Hall of Gems and Minerals and, when combined with the Stuart Hall, will constitute one of the largest exhibits of its kind in the world. The theme of this new exhibit will be Gemstones and Their Origins—from their formation in the earth, to man's quest to recover them, to the finished, cut gemstones.

The Natural History Museum will be holding a number of special events on May 3 through 5, 1985, in conjunction with this opening. These events will include lectures, demonstrations, book signings by well-known authors in gemology, and a special weekend seminar on gems held in collaboration with the Gemological Institute of America. In the meantime, please mark your calendars so that you can enjoy a multifaceted weekend at A GEM OF A MUSEUM!



Walt Disney's Dumbo

A Spring Holiday Treat for Members
10:30 a.m. Jean Delacour Auditorium **March 30, 1985**

Introduce your youngsters to Dumbo, the baby elephant whose oversized ears make him the laughingstock of the circus. Befriended by Timothy, a sympathetic mouse, Dumbo flies to fame and fortune when he learns to use his ears as wings. This animated fantasy, filled with color, humor, and lyrical music (Dumbo won Walt Disney Productions an Academy Award for scoring of a musical film), will make your holiday spirits soar.

Admission is free for museum members, but reservations are required. Please send this form along with a stamped, self-addressed envelope to Film, Education Division, Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007.

HOLIDAY FILM PROGRAM

Name _____
Address _____
City _____
Zip _____
Phone _____
Number in party _____

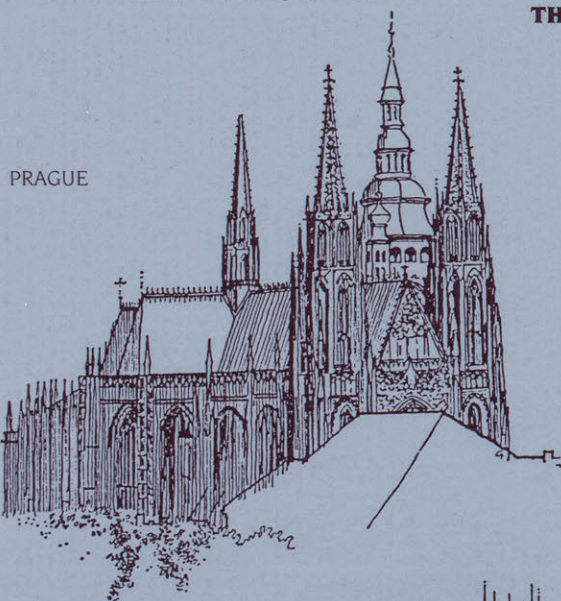
• 1985 MEMBERS' TRAVEL PLAN •

COLONIAL SOUTH YACHT CRUISE

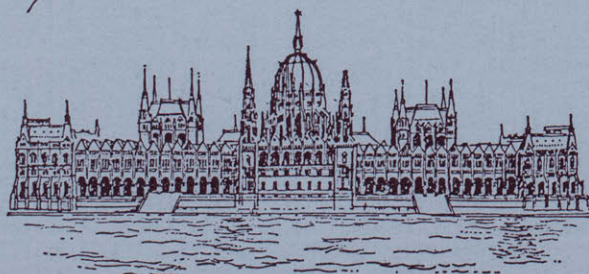
April 13–20 Sail with us through the heart of the Old South in the comfort of a cruise ship. We will visit historic ports, photograph graceful antebellum homes, and walk through showplace parks of ancient oaks covered with Spanish moss. The cruise will also take us into the exclusive resorts of Hilton Head and Saint Simon Island, as well as Savannah, Charleston, and other centers of the Colonial South, \$1579 and up, including air fare.

ROMANTIC CITIES OF EASTERN EUROPE

May 2–13 Vienna, Budapest, and Prague are three contemporary European capitals that continue to evoke an aura of Old World elegance and romance. We'll savor the coffee houses and palaces of Vienna, see the bridges that weave Buda and Pest into a wonderful fabric of folk art, and visit Prague—the city of a hundred spires. The Vienna Woods, Prague's castle and gothic cathedral, Budapest's gypsy music and Liszt concertos await you in Eastern Europe. Time will be allowed for shopping in all three cities as well as in Helsinki, where we will stop over on our Finnair flight. \$1799, including air fare.



PRAGUE



BUDAPEST

EUROPEAN HISTORICAL GARDEN TOUR

June 12–July 3 Garden enthusiasts will love this tour accompanied by Mr. Robert Gustafson, the museum's Assistant Curator of Botany. Visits will be made to historical gardens in Rome, Florence, Venice, Paris, and London and environs. \$3008, including air fare.

TROPICAL ECOLOGY: THE AMAZON

June 25–July 14 Our Amazon adventure takes place in the extreme northeastern portion of Peru. Early morning bird walks, night hikes, overland explorations, and boat tours of the Amazon will be part of our observation and study of several superb, undisturbed Amazonian habitats. Participants will travel the river via float plane, *canoas* (large dugout canoes with sides and roof), and small dugouts. Hikes into the forest are planned to be short, on mostly level ground, and will not be strenuous. Accompanying us will be Dr. Charles Hogue, the museum's Curator of Entomology. This trip is offered in cooperation with UCLA Extension and the American Horticultural Society. Around \$3275, all inclusive.

THE MAGNIFICENT NORTHEAST PASSAGE

July 6–12 Join us on this cruise in crisp, clean air to shores of unspoiled beauty and to ports rich in the maritime history of North America. From New York City the cruise will pass through Newport, Rhode Island; Fall River and New Bedford, Massachusetts; Cape Cod Canal; Sydney and Halifax, Nova Scotia; Bonaventure Island and Percé Rock; the Saguenay River, Quebec City, and Montreal. From \$1475, including air fare.

KENYAN SAFARI August 19–September 1 Explore some of the most breathtaking scenery in the world, from snowcapped mountains to lush river valleys, endless savanna plains to jungle forests. Travel with Kimball Garrett, museum Curatorial Assistant, to Nairobi, Mount Kenya, Lake Nakuru, and Masai Mara. Optional trips are available: August 16–20 to London and August 31–September 5 to Mombasa. From \$2730, including air fare.

GRAND CANYON RIVER RAFTING

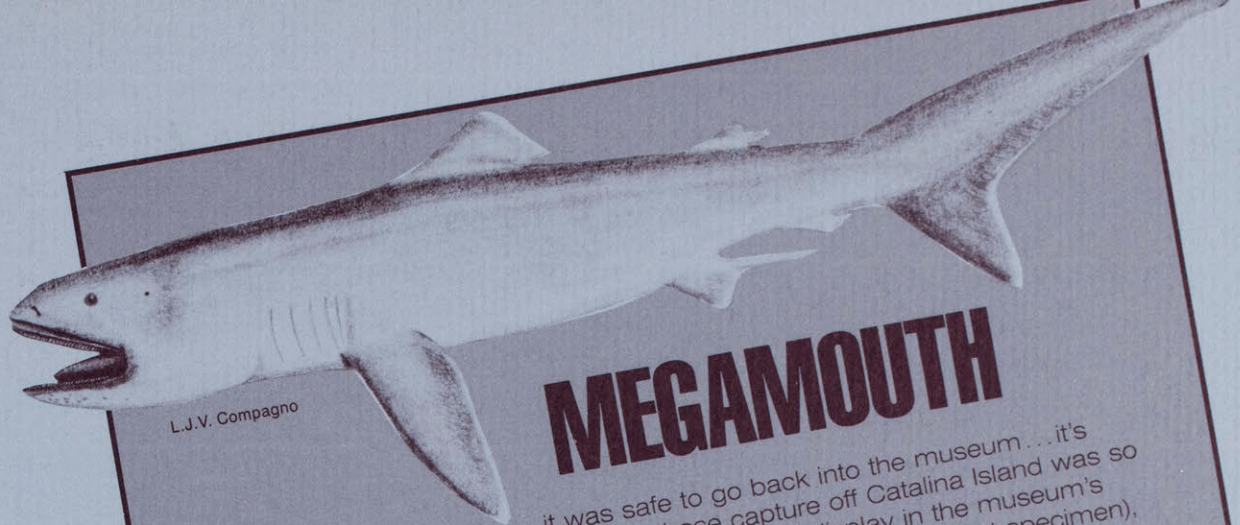
September 1–7 The Wilderness Studies Institute will lead this exciting trip on the Colorado River. Floating through the ageless Grand Canyon is an unforgettable experience, and many of those who went on this trip last year plan to join us again. The trip includes lectures on geology, archeology, wildlife, and other fascinating aspects of the Grand Canyon. About \$500, including transportation.

CHINA September 13–29 Come join us for a truly exotic adventure through China! We will visit Beijing (Peking), Shanghai, Hong Kong, and Chongqing. Visit an agricultural commune, a silk factory, an oriental rug factory, museums, and the Beijing Zoo. We'll go shopping in Hong Kong and feast on Peking Duck. \$3799, including air fare.

EGYPT AND THE CIVILIZATIONS OF THE NILE October 10–25 With our expert Egyptologist and accomplished archaeologist Dr. Nabil Swelim, we will travel back in time nearly five thousand years to visit the remarkable step pyramid of Pharaoh Zoser, the ageless stare of the mysterious Sphinx, and the temple remains of Karnak and Luxor. The trip includes an eight-day cruise down the Nile. From \$3491, including air fare.

There's more to come: Greece, November 4–17, from \$1720, including air fare; India in November; Antarctica in January 1986!

Please call Becky Chapman at the Membership Office (213/744-3426) for information about the Members' Travel Plan.



MEGAMOUTH

Just when you thought it was safe to go back into the museum... it's Megamouth! The fifteen-foot shark, whose capture off Catalina Island was so recently international news, will be on permanent display in the museum's foyer. Only the second of its kind ever snared (and the only intact specimen), this plankton-eating shark was known only from fossils until 1976, when the first living specimen was caught.

Free Films & Gallery Tours

In March and April the Tuesday film and gallery tour program will focus on dinosaurs, ruling reptiles of the Mesozoic era. Films will begin at noon in the Jean Delacour Auditorium, and tours will start at the North entrance at 1:30 p.m.

March 5, 1985
HOT-BLOODED DINOSAURS

Film

Color 52 minutes

This recent BBC film explores the controversial theory that dinosaurs were warm-blooded animals whose modern descendants are birds. Fossil bone analysis, the geographical distribution of dinosaur remains, and modern predator/prey ratios are some of the forms of evidence examined in testing this theory.

April 2, 1985
DINOSAURS

Film

Color 53 minutes

This collection of four animated films, specifically chosen for the younger (or young at heart) viewer, will transport you back to the time when dinosaurs or "terrible lizards" ruled the earth.

March 5 and April 2, 1985 Tour
DINOSAURS AND THEIR RELATIVES

This tour will introduce you to dinosaurs and other Mesozoic animals. Featured will be the *Camptosaurus*, *Allosaurus*, *Stegosaurus*, *Anatosaurus*, *Corythosaurus*, and *Tyrannosaurus rex*. Flying and marine reptiles will also be discussed. Included on the tour will be our moving, half-sized models of *Apatosaurus* (more commonly known as *Brontosaurus*) and *Triceratops*.

Birds: Our Fine Feathered Friends

A YOUTH WORKSHOP FOR GRADE LEVELS 3 TO 5

SATURDAY, APRIL 20, 1985—
NATURAL HISTORY MUSEUM

SATURDAY, APRIL 27, 1985—LOS ANGELES ZOO



What are birds? What is their place in the animal kingdom and how are they adapted for their life in the air? These and other questions will be explored in the third annual youth workshop offered by the Natural History Museum and the Greater Los Angeles Zoo Association for the children of members. The class will include behind-the-scenes tours, hands-on workshops, films, take-home materials, and a viewing of the Zoo's spectacular Bird Show. Enrollment is limited to 20. Cost \$20. Please send the form and your check or credit card information with a stamped, self-addressed envelope to Joan Grasty, Education Division, Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007.

Youth Workshop

Name _____

Address _____

City _____ Zip _____ Phone _____

☐ My check for \$20 is enclosed. (Please make checks payable to the Natural History Museum Foundation.)

☐ Charge to my Visa Account # _____

or MasterCard # _____

Signature _____ Expiration date _____

The Natural History Museum, located at 900 Exposition Boulevard, Exposition Park, Los Angeles, California 90007, is open from 10 a.m. until 5 p.m., Tuesday through Sunday. The museum is closed Mondays, Thanksgiving, Christmas, and New Year's Day. Admission is \$1.50 for adults and \$.75 for students and senior citizens; children under 5 are admitted free. For further information on museum activities and future events, please call the Membership Office, 213/744-3426.

The Page Museum of La Brea Discoveries, located at 5801 Wilshire Boulevard, Hancock Park, Los Angeles, California 90036, is open from 10 a.m. until 5 p.m., Tuesday through Sunday. The museum is closed Mondays, Thanksgiving, Christmas, and New Year's Day. Admission is \$1.50 for adults and \$.75 for students and senior citizens; children under 5 are admitted free. For further information, please call 213/857-6311.

OPENING EXHIBITS

Ban Chiang: Discovery of a Lost Bronze Age. March 2 through May 31.

Megamouth. On display indefinitely. Deutsch Gem Gallery. Opening May 3.

CONTINUING EXHIBITS

California Condors.

Cast of *Homo erectus* skull.

Mountain Light. Through March 24.

Mushrooms Up and Down

Los Angeles.

Recent Acquisitions: Pueblo Pottery.

Through November 15.

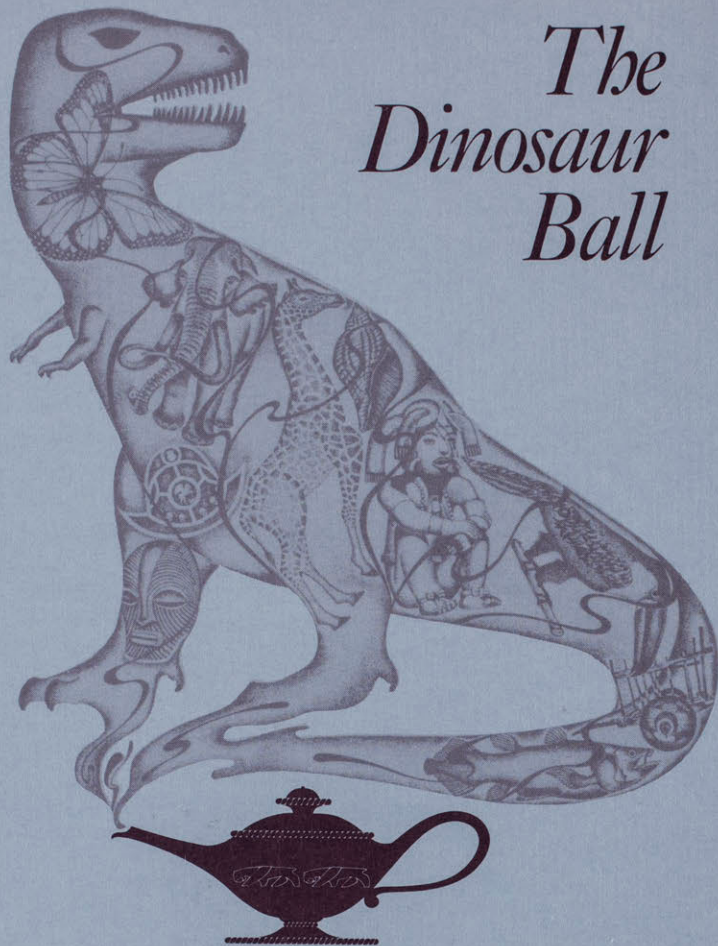
Tops! Through March 10.

FREE FILMS AT THE PAGE MUSEUM

The Page Museum is open free of charge on the second Tuesday of each month, and admission to screenings of special films is also free on that day. On March 12, *Connections: Distant Voices*, showing the advantages stirrups gave to the Normans at the Battle of Hastings, will be screened. *Connections: Faith in Numbers*, an antic explanation of the effects inventions have had on the development of Western civilization, will be shown on April 9. The films will be shown at 1:30 p.m. and again at 3:30 p.m. in the museum's Education Classroom; for further information, please call the Page Museum at 213/857-6306.

Discover the Magic of the Natural History Museum.

March is the month for the Annual Museum Fundraising Ball. Last year's Dinosaur Ball was a great success and one of the more exciting social events of the season. On Saturday night, March 23, the museum balls will once again be filled with music and romance. If you would like to dance and dine among the dinosaurs, call 213/742-0822 for more information.



The Dinosaur Ball

BUSINESS ASSOCIATES UPDATE

The Business Associates are corporations and corporate foundations that provide annual financial support to fund the museum's research and educational programs. Members of the Business Associates make annual contributions of

\$10,000 Corporate Leader

\$5,000 Corporate Sponsor

\$2,000 Corporate Contributor

Since the membership roster was published in the May/June 1984 issue of *TERRA*, the following companies have joined the Business Associates:

Abbott Laboratories
Lloyd Andersen & Associates, Inc.
Avery International
Bell Industries
CalMat Company
Capri Lighting
Collins Foods International, Inc.
Drexel, Burnham, Lambert, Inc.
Econolite Control Products, Inc.
Ernst & Whinney
Esjay Enterprises
McMaster-Carr Supply Company
O'Melveny & Myers
Pacific Lighting Corporation
J. Walter Thompson USA
The Thornton Foundation

The following companies have increased their annual gifts, qualifying them for a higher level of membership:

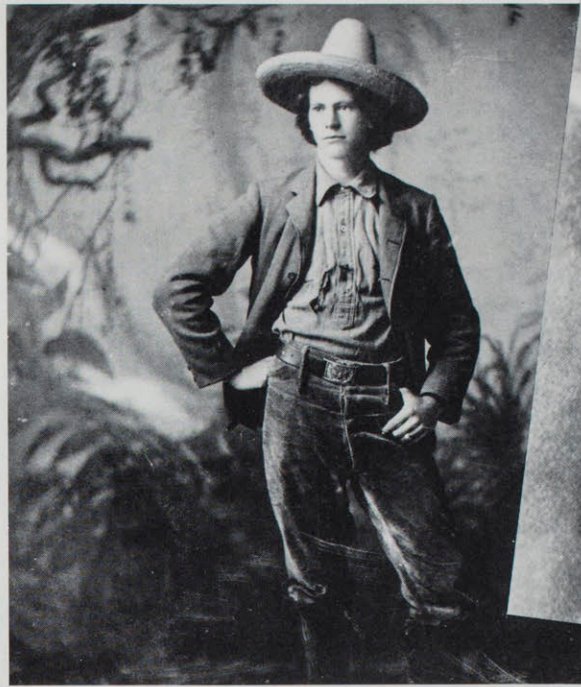
BankAmerica Foundation
Garrett Corporation
Newhall Land and Farming Company
Northrop Corporation
Rockwell International
Santa Anita Foundation
Security Pacific Foundation
Times Mirror Foundation

Please join us in thanking these corporations and corporate foundations for their support. For further information on becoming a Business Associate of the museum, please call Don Gross at 213/744-3307.

The Natural History Museum Goes Shopping!

We are looking for volunteers to take the museum to shopping centers all around Los Angeles County. Your mission, should you choose to accept, will be to help us make more people aware of the wonders of the Natural History Museum—and the joys of being a member! Our first foray was into the ARCO Plaza Shopping Center during the December holidays. Shoppers' curiosity was aroused by a sabertooth skull and miniature dinosaur on display at our table, and people came over to talk and pick up museum membership brochures and other literature. We gained new members and new friends from the effort, and now we'd like to explore other shopping centers. If you'd like to help, we'd like to hear from you! Please call Becky Chapman in the Membership Office at 213/744-3426.

Opposite page: This headline appeared in the Arizona Republican on March 27, 1909. The San Francisco Mining & Scientific Press of April 3, 1909, gave its readers some advice: "It must be distinctly remembered that up to the present there is not so much as a 10-ft. hole in the entire region of the discovery."



Arizona Historical Society

Above, left: Dick Wick, as the youngster recently arrived from Iowa, lost no time in adopting Western dress. Right: Dick Wick in the early 1920s, the seasoned promoter, author, and pumper of Salome's "Laughing Gas."



Dick Wick's gas station and some of the prose that caught the attention of the Saturday Evening Post.

THIS IS THE LAUGHING GAS STATION
 WHERE WE SELL GASOLINE WITH A SMILE -
 OLD ROXEFELLER MADE HIS PILE - AND TAKE YOUR MONEY - AFTERWHAILE
 WE ARE HERE TO FILL YOUR TANK - AND MAYBE WE WILL -
 SO STOP AND SEE US AS YOU PASS - FILL YOUR TANK WITH LAUGHING GAS.
 I DON'T HAVE TO CROSS THE TRACK WHEN YOU WANT TO SPEND YOUR JACK -
 DRIVE RIGHT UP WITH YOUR OLD BUS AND LEAVE YOUR MONEY HERE WITH US
 YOU WILL GET YOUR DOLLARS WORTH IN GASOLINE OR ELSE IN MIRTH -
 WE WILL TRADE YOU ANYTHING - MINING STOCK FOR A DIAMOND RING
 FIFTEEN ACRES OF SAGE BRUSH LAND FOR AN OLD CALLIOPE - SECONDHAND -
 FIVE NEW TIRES WE WANT TO SELL - CANNED TOMATOES AND BLACKBERRY JELL -
 ICE CREAM, SODA AND ALMOST BEER - ACETYLENE WELDING DONE RIGHT HERE -
 SALOME WATER - PAINTED JOKES - WILD GOAT GLANDS - GOOD BYE, FOLKS.

The Salome Sun—some of Dick Wick's prose and poetry, which the Saturday Evening Post shared with its readers in the 1920s. The town of Salome (pronounced without an accent on the e) was a dream in the desert created by Charles H. Pratt and Dick Wick, hoping to capitalize on the railroad that was on its way. The railroad came, but the developers were a mile or so off, so Pratt and Dick Wick merely moved the town a bit. The town's name was derived from Pratt's wife, Grace Salome Pratt. Dick Wick said that she tried to walk

(Continued from page 15)

Hall's greatest talent, though, was to establish an event (a rose-growing contest, a gold strike) and then write newspaper articles and place advertisements

barefoot in the desert, but found the sands very hot. He suggested that she keep her shoes on or she would burn her feet—or, she could continually dance. To this day the town is usually referred to as "Salome—Where She Danced."

in a given area, a veritable flood of them, to convince an assortment of his fellow men to invest in land, stock, or some other measure of assumed wealth. Dick Wick wrote many newspaper articles for Arizona and California publications, some with his byline. If he were pushing a particular project at the time, his name was in the body of the article, but he then modestly took no credit for the article.

Such activities were seldom illegal. Stock promotion was widely practiced throughout the world and was rarely restrained by the authorities. Hall, and many others, were able to walk the narrow line between fair and fraud. This was not a game limited to the American West, as flamboyant stock promoters were found in London, Johannesburg, and Sydney. Nonetheless, the American mining promoter did have more of a tradition of fleecing his customers, much of it traceable to the fantasy and dreams of sudden riches generated by the Gold Rush.

The mining profession in general opposed these gaudy stock promotions and urged investors to study and make on-the-spot inspections before investing in any of these wildcat schemes. And in the professional journals such as *Mining & Scientific Press*, editors tried to warn the gullible, in and out of the profession. The opportunity for a quick killing, though, was too hard to pass by for many investors. Hall knew this and from time to time was able to profit from it. Hall was mentioned in several publications, such as the *Mines Handbook*, as one given to exaggerated promotions, but his career did not apparently suffer from such judgments.

The pieces reproduced here are representative of Dick Wick's prose and poetry. Some pieces, such as the advertisements, were intended for a large audience in California. Others, such as the pamphlets or newspaper articles, were aimed at selected readers (i.e., investors). My field work has taken me to some of the dusty trails where Dick Wick hawked his certificates, especially his many holdings in the Plomosa Mountains near Quartzsite and the copper and gold prospects between Salome and Swansea. Of particular use in understanding Dick Wick as promoter was the extensive collection of Hall correspondence in the Arizona Heritage Center, Tucson, and the fine newspaper collection in the Phoenix Public Library. All this material on Dick Wick, and many additional manuscripts, maps, and published works on Western mining are available in the L.A. County Museum of Natural History's new Seaver Center for Western History Research.

Donald Chaput is a curator of history and has a strong interest in mining in the American West and the South Pacific. His articles have appeared in journals in California and Arizona as well as in Australia and the Philippines.

SALOME FOR FUN SUN

MADE WITH A LAUGH
ON A MIMEOGRAPH

DICK WICK HALL, EDITOR
SALOME, ARIZONA.

WARM NIGHTS IN THE WILDERNESS.

These Warm Nights I have been reading the Melodies of Sweet Mama, by a Red Hot Papa called Omar Khayam, who used to live out here on the Desert before I come here. I know how he felt - because it is so Different now, so I am going to Sympathize a Few Lines with him. You don't have to read it unless you want to, but if you are Young Enough, you can Sing it on the Back Seat to the tune of almost any good six Cylinder car headed out into the Desert on an Arizona Moon Light Night. Crank her yp, Bill, Step on the Gas and Listen to Her Sing:

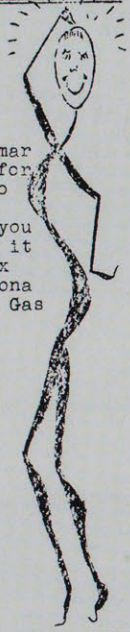
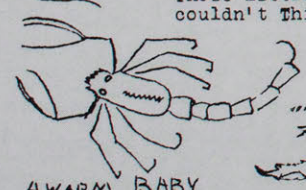
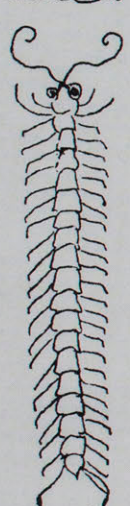
When Omar Khayam said that he could Dine
On a loaf of Bread and a Jug of Wine,
With Her beside him and be Satisfied
Out in the Wilderness with his Brude -
Omar wasn't worrying about High Rents
Or of honeymooning at a small expense -
He meant that he liked the Greasewood Smell
And the Long Hot Days that Feel like Hell -
The Red Sunsets and the Cool Moon Light
And the Soft Sweet Air of the Desert Night
And the Dim Faint Trail that led out to
The Queen of the Desert and His Rendezvous.

Old Omar Khayam was the Head of his Klan
And He Lived his Life on Some Loving Plan -
With his Girls and Wine & a Big Silk Tent -
MY, OH MY!!! * * * * * What a Life He Spent
For Omar was a Loving and Luxurious Brute
And a Connoisseur, when it come to Fruit,
And he Could Tell, in the Dark by the Shape,
Just How Much Juice there was in a Grape -
And he Sipped His Honey, like a Wise Old Bee,
On the Summer Nights 'neath a Mesquite Tree.

Old Omar was a Go Getting Hum Dinger Man -
The Bell Ringing Chief of the Khayam Klan -
And Out in the Desert with his Turtle Dove,
He learned All There Was of Living and Love -
With a Sweet Little Arab by His Side -
He Lived and Loved - and Was Satisfied.

The Desert is here, like it Always Was -
But you can't Khayam any more, Because
In these Dry Days, when Wine is Taboo,
What in the Devil can a Poor Man DO?
We can only long for those Good Old Days
When the Game of Life was Played Three Ways -
When Living was Easy - and Love Ran Loose -
And Doves were Looking for A Good Excuse.

Those little *****Marks are where I
couldn't Think What To Say. The Frog
Knows
What
They
Mean
Ask
Him



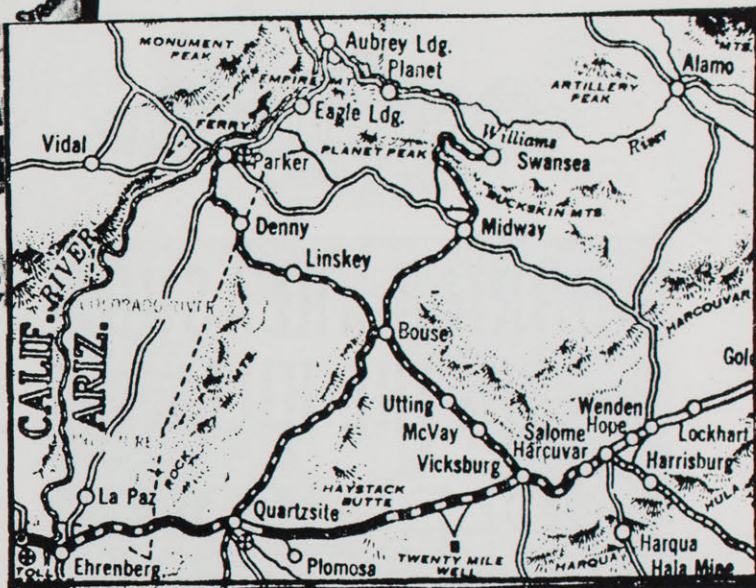
SALOME HAS GOT A WONDERFUL WINTER CLIMATE TOO.



The "Salome Frog" and the "Reptile Kid," two of the well-known Hall creations; others included "Gila Monster Jake" and "Sheepdip Sam." Most of Dick Wick's artwork was drawn by George Claude Putnam, Sr. Dick Wick described Putnam as a fellow who drifted into town "and has been picking the thorns off of the Cactus on our Cow Ranch." The reality was in keeping with Dick Wick's own folksy posture but more cosmopolitan behavior—Putnam was the art director for a Los Angeles advertising firm.



In the early 1930s Salome was on the main highway from Phoenix to the Colorado River. However, the new freeway between Phoenix and Los Angeles (Interstate 10) is miles south of Salome, a further handicap to the great destiny planned by Dick Wick.



Arizona Historical Society

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Day Letter	☐
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Night Letter	☒

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WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT
GEORGE W. E. ATKINS, FIRST VICE-PRESIDENT

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Send the following message, subject to the terms on back hereof, which are hereby agreed to

To **THOMAS HALL, Telephone Hall Bros. Fruit Ranch**
Street and No. _____ Phoenix, Arizona,

Place _____
HAVE BOUGHT FINE LEASE AMONG GUSHERS JUST LEAVING FOR MOBILE ALABAMA
NO WORD FROM YOU YET WIRE ME AT CANTON HOTEL MOBILE WHETHER
THAT DRAFT WAS PAID OR NOT IF PAID WIRE MONEY TO FORT WORTH
NATIONAL BANK TO MY CREDIT AS DIRECTED. EVERYTHING FINE DONT
WORRY WILL WRITE WHEN I GET TIME. HAVE BEEN OFFERED FIFTY
THOUSAND FOR MY LEASE ALREADY BUT AM GOING TO DRILL WELL AT
ONCE AND TRY AND GET A BIG ONE. BIG BOOM AT RANGER NEVER SAW
ANYTHING LIKE IT.
D. W. HALL

In private correspondence with his father, Tom Hall, Dick Wick was a little more relaxed in his language, using a phrase such as "get a big one."

Giving the Investor A CHANCE

The Best Chance you will ever get to make money mining--by dealing direct with an Arizona miner and getting your share of the profits.



BURIED TREASURE IN THE HILLS

GOLD, SILVER COPPER

25,000 square miles of undeveloped Mineral Resources in Western Arizona

Give Your Money a Chance Where it Can Work For You

Arizona Historical Society

These advertisements were part of the Hall promotion for the 1909 Salome strike. Here was true gall, a promoter in one of the harshest environments in North America praising the location for pure sweet water and invigorating climate. "How's that for Salome!"

ALL ROADS LEAD TO SALOME!
All roads lead to Salome!
You bet your boots they do!
Salome has got the Mines and Water,
And she sure is coming through.
Salome has got the Gold and Copper
In a hundred miles around,
And a hundred thousand acres
Of unprospected ground.
Salome has got the water—
And it's water fit for kings,
And the other towns all drink it—
Though they say unpleasant things.
Now Salome has made a gold strike
Richer than the one at Nome
And folks from everywhere are coming,
For All Roads Lead to Salome!
—Hit the Trail!

Arizona Republican

WHO I AM

I am an Arizona Miner—not much for looks, maybe, but strong for action. Anyone in Arizona can tell you who I am. I have sometimes been called a "roughneck," for spending so much time running around in the hills in my old clothes, searching for and developing good mining properties—but a man can't make a success of real mining hiking around these hills in high heels and collars and silk shirts and stockings—and while my neck may be rough from the sun and wind, There is Nothing the Matter With My Head. Good clothes are all right in their place—and I've got some—but real honest-to-God mining in the mountains and deserts of Arizona takes hard men and hard work.

WHAT I DO

I mine in the ground—and the many shafts, tunnels and other underground workings around western Arizona are the best evidence of it. If you want to invest money in mining with some man because he wears fine clothes, looks well and talks nice, better hunt up some eastern broker or promoter with luxurious offices in some city a thousand miles or more from any mine—and Your money will help pay for the fine clothes and fancy offices—But if you want your money invested in the ground, where all the gold comes from; if you are willing to take a fair chance with an Arizona mining man, and you don't care how he looks or what he wears, as long as he gives you "A Square Deal" and divides profits honestly with you as agreed—"That's Me."

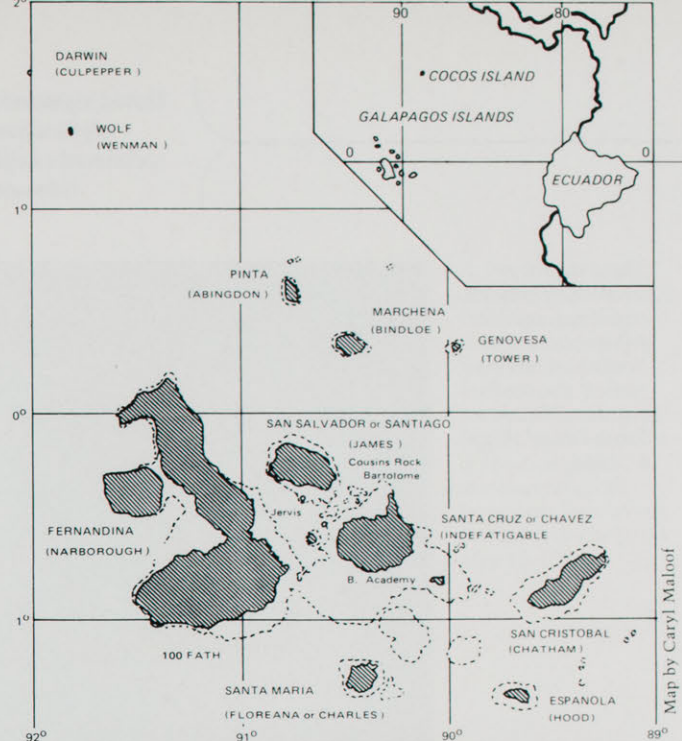
In the 1920s Hall tried to rekindle interest in the mines around Salome. In addition to the Dick Wick prose, we have here an interesting portrait, drawn by Hall, of the differences between a good roughneck Westerner and the eastern fellow in silk shirt and stockings.

SALOME

It's the town
On the A. & C.
It's the mines,
Look good to me.
It's the climate,
It's the water—
If you don't go
You had oughter.

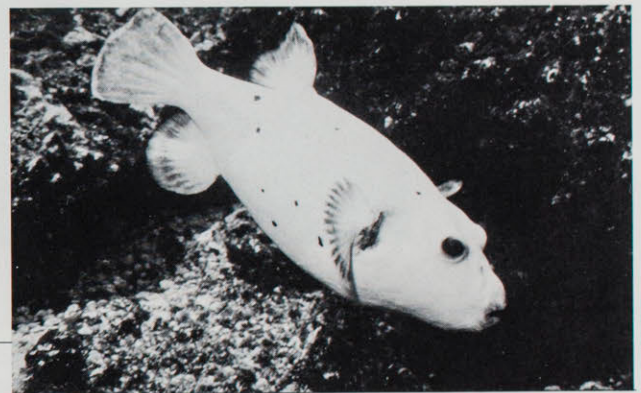
Arizona Republican

The Galapagos Archipelago; note the equator running through the north end of Isabela and the separation of Darwin and Wolf from the other islands. Inset at upper right shows the relationship of the Galapagos to Cocos Island and the Central and South American mainland.



Notes on a Cruise in the Galapagos Islands-May 1984

by DANIEL M. COHEN



The golden phase of the smooth puffer, *Arothron meleagris*, at twenty feet near the south tip of Pinta Island. May 20, 1984.

Cachalote, a sixty-foot, two-masted, ketch-rigged motor-sailer, is moored over 120 feet of clear blue equatorial water on the west side of Wolf Island, one of the Galapagos; equatorial water indeed, for we are only sixty miles north of the line. The ship floats at the center of a semicircle outlined by 500-foot gray basalt cliffs, rising nearly sheer from the sea and plunging beneath the surface for another 100 feet. Scraggly bushes cover the several rock slides and outline narrow ledges of basalt, which trail chains of prickly pear cactus. A gentle surge rocks *Cachalote* and traces a delicate white fringe as the swell slides against the upright face of the cliffs and invades the caves and grottoes at the base. Arrhythmic smacks echo across the deck of the ship, attesting to the accuracy of David Good, a Berkeley graduate student, in massacring starving flies, apparently inadequately nourished

by the boobies, frigate birds, and swallow gulls that roost and nest along the cliffs. A cluster of frigate birds hurtles at us, baited by the unwitting generosity of Hugo, our masterful, garlic-loving ship's cook extraordinaire, as bits of fat and gristle trimmed from a chunk of gamy Galapagan beef fly through the galley porthole. I can see the ship's skiff lifting in the swell as it awaits the return of its complement of underwater explorers, their sacks and nets bulging with specimens plucked from the face of the underwater cliffs.

Above the water and beneath it we have marveled at unique and bizarre sights as we crisscrossed Charles Darwin's path. The unknown has moved explorers since the dim past of human curiosity, and biologists are powerfully curious. But we came to question as well as to wonder. Knowledge to be gained from gathering and studying specimens

from every segment of the globe is becoming more and more the special function of museums. But gathering for its own sake is increasingly difficult to justify. The geographical limits of the globe are finite and so is our ability to store collections. Stop we never will, but increasingly we justify our acquisitions on the basis of how they may help us answer specific questions.

Few educated persons are unaware of the very special role that the animals and plants of the Galapagos Archipelago played well over a century ago in raising the consciousness of a curious and thoughtful young Englishman during five weeks spent in the islands. Darwin noticed three things: first of all, he saw plants and animals that were unknown; second, he recognized similarities between many Galapagos animals and plants and some that he had seen on the mainland of South America; and, third,

David signaled for an early pickup one night when an angry sea lion claimed the flat rock that both had chosen for a bedroom.

Three divers at work searching for small narcotized fishes over rough bottom at forty feet off the north-eastern side of Pinta Island. May 17, 1984.



Jack Grove

he recognized lesser degrees of difference between Galapagan animals and plants from different islands in the archipelago than between island forms taken as a whole and their apparent mainland relatives. All this information, along with his observations on the geology of the archipelago, helped to start him on the long train of thought and study that culminated in his revolutionary book, *On the Origin of Species*, in which he described the theory of organic evolution, now accepted as fact.

Given that evolution does occur, inquiry is now centered on how it works, and alternate explanations are being considered for Darwin's observations in the Galapagos and for similar studies from all parts of the world. Debate on the evolution of the Galapagan biota is presently concentrated on its derivation, with some researchers maintaining that all the plants and animals arrived at these great untidy heaps of lava and cinder via air or across the sea over great depths. Other investigators propose a connection with the mainland, now some six hundred miles away, or, an even more imaginative idea, that segments of land detached from the South American continent and drifted to their present location, ferrying an unwitting cargo of

plants and animals, which have subsequently evolved in isolation. Hundreds of scientists enduring no small measure of discomfort during their work in the Galapagos have produced thousands of technical publications on geology, taxonomy, anatomy, ecology, physiology, and genetics relating to these questions, partly because of the fascination of the islands, but also because answers to the questions offer insights on the mechanism of evolution throughout the sphere.

Previous research notwithstanding, there is not yet a clear consensus as to which hypothesis is the most viable. Research emphasis has centered on the larger, more spectacular organisms—flowering plants, especially the cactus and sunflower families; tortoises; iguanas; and birds such as the Darwin's finches, penguins and other seabirds, and the Galapagos hawk, mockingbird, and dove—from the most easily accessible islands. Our investigations concentrated on small animals living in habitats that require special sampling techniques in the more distant northern islands.

The climate in the northern islands is warmer and more tropical than it is in the southern isles, which are located on or immediately adjacent to the equator. A combination of wind, ocean currents,

and the shape of the underwater platform on which the islands perch forces cold, nutrient-rich water to the surface off the southern islands and chills the air. The northern ones are bathed by warmer seas, even though they are more distant from the equator. The two most distant islands, Darwin and Wolf, are difficult to reach under the best conditions and sit in truly shark-infested waters. They are rarely visited, have received scant attention from scientists, and were our chief goal.

John Wright, Curator of Herpetology, has a long-term program of studying the evolution of small lizards and trying to learn through the analysis of proteins about the relationships of populations on the different islands to each other and to their apparent relatives on the mainland. This trip was one of many that he has made to the Galapagos, but it was particularly valuable because he was able to land on Darwin and Wolf. He has described in detail his objectives and methods in a recent *TERRA* article (March/April 1984). On our trip Wright and his colleague, David Good, spent clammy, uncomfortable nights ashore, scrambling over knife-edged lava rock and through flesh-rending brush in search of nocturnal lizards. Only the expert small-boat handling of our crew al-

Collections included fourteen species not previously found in the archipelago, four of which are new to science and unnamed.



A dead coral head (Porites) with the alga Caulerpa growing over it at thirty-five feet, north of the arched rock at the south end of Darwin Island, northernmost of the Galapagos. A large surgeonfish, Prionurus laticlavus, hovers over the coral. May 13, 1984.

Jack Grove

lowed Wright and Good to land on rough, wave-lashed shores. David signaled for an early pickup one night when an angry sea lion claimed the flat rock that both had chosen for a bedroom.

Most of our scientific party was composed of scuba diving marine biologists. Although the islands have long been a favored locality for investigations of life beneath the sea, as always, the large, showy, and most easily accessible members of the fauna have received the most attention. Our group searched for the small and hidden. Jim McLean, Curator of Malacology, collected mollusks, specializing in tiny snails sifted and picked from bottom sediments. (His collecting methods were described in *TERRA*, July/August 1984.) Microscopic crustaceans sieved from the sediment were the quarry of Anne Cohen, graduate student at George Washington University and Museum Research Associate. The fish contingent was led by Bob Lavenberg, Curator of Ichthyology, and Bill Bussing, University of Costa Rica professor and long-time Museum Research Associate; other ichthyologists were Andy Jahn, Museum Research Biologist, Marty Meisler, University of Southern California graduate student, and myself. Galapagos naturalist Jack

Grove took underwater photographs and helped all the divers.

The Galapagos marine fauna appears to consist of notably fewer species than do adjacent continental areas. If the archipelago or any part of it ever had shallow water connections with the mainland or with Cocos Island to the north, more species would be expected, especially ones not known to disperse readily over great depths. Trawls and dredges often used by marine biologists do not operate well on the jagged, sharp bottom that prevails in most of the area. Scuba diving is the only way to find the scattered pockets of sediment at depths to 100 feet, which serve as home for the small animals constituting the benthic in-fauna, and in scooping up small fishes that are narcotized and flushed from holes and cracks in the jumbled lava substrate. Our collections were the first ever made from many of the areas and habitats we sampled.

Anne Cohen was chiefly interested in collecting tiny ostracod and isopod crustaceans for herself and for Curator of Invertebrates Richard Brusca. According to published information, species of both groups are absent or poorly represented at the Galapagos. This could mean that the islands had never been connected to

the mainland and these poor dispersers never had made the trip. It could also mean that evidence of past connections was indeed present but remained undiscovered. Intensive collecting efforts and preliminary analysis of sediment samples has yielded only a few of these tiny crustaceans, suggesting the absence of a connection. Jim McLean collected about two hundred mollusk species, close to 70 percent of those known to live in the Galapagos. Specimens have been sorted and entered into the museum collection where they await detailed analysis. About one hundred species of fish were taken, representing close to 35 percent of the known Galapagan fish fauna. Collections included fourteen species not previously found in the archipelago, four of which are new to science and unnamed. The fish fauna found at the warm water northern islands of Darwin and Wolf has a 90 percent similarity with other, cooler water but geographically closer islands of the archipelago, and a 72 percent similarity with the warm water but more distant Cocos Island. Again, more detailed analysis of species and determination of their closest relatives will be required before well-documented conclusions can be drawn. A fine collection of underwater photographs was taken to

The widespread coral mortality might be due to the high temperatures during 1983 caused by an extensive inflow of warm water, part of a major El Niño phenomenon.



Our headquarters, the motor-sailer Cachalote out of Puerto Ayora in Academy Bay, off North Seymour Island.

Anne Cohen

help illustrate a book by Lavenberg and Grove on Galapagan fishes.

Underwater observations on corals proved interesting and puzzling. A newly published book on Galapagos reef corals by Peter Glynn of the University of Miami along with Gerard Wellington and John Wells described flourishing coral formations in a number of localities we visited. We found dead reef-building corals everywhere, many of them overgrown with algae, but only a few living corals. This widespread mortality (which Glynn has now reported from many localities in the tropical eastern Pacific) might be due to the high temperatures during 1983, the previous year, caused by an extensive inflow of warm water, part of a major El Niño phenomenon that periodically sweeps through the Galapagos and causes major climatic perturbations. The puzzle is that although 1983 water temperatures were slightly higher than normal, they were well below the upper limits at which reef corals flourish throughout tropical seas.

Was our trip a success? Yes indeed, and the payoffs will accumulate for

many years.

A final anecdote concerns our quest for *Caecogilbia*, a small, nearly blind fish known only from a few specimens collected on Santa Cruz Island in brackish pools located in crevasses in the lava rock with no surface connection to the sea, a kilometer or more distant. Study of the fish family Bythitidae, to which these small, pink, live-bearing fishes belong, has been a long-time interest of mine, and although I have examined specimens from which the species was described, now stored in the Belgian Museum of Natural Sciences in Brussels, I wanted to have specimens in Los Angeles for detailed study.

In Puerto Ayora, *Cachalote's* home port, we contacted André De Roy, a Belgian resident of many years, who had first discovered the pools while hunting goats to feed his family. Mr. De Roy was unable to guide us to the best pools because the underbrush was virtually impenetrable due to the previous year's El Niño rains and because the island goat population, which feeds on underbrush, had been decimated in an effort to save the native flora. But he did recommend that we contact Dr. Gunther Reck, Director of the Darwin Station across

Academy Bay, for information about a pool on the grounds of the station where *Caecogilbia* had been seen. One afternoon Reck escorted Marty Meisler, Anne Cohen, and myself up a well-kept path to a thirty-foot-long, four-foot-wide crack in the lava. Meisler and I clambered to the bottom and found three 12- to 15-foot-deep pools of chilly, clear brackish water. We plunged in, armed with small nets and underwater lights. A long-armed, pincher-tipped shrimp nipped Meisler and ended up in a specimen jar, as did swarms of tiny, blind crustaceans that we netted. But no fishes were seen. While combing the deepest pools, Meisler found a niche in the rocky side near the bottom; his light framed the altarlike structure and reflected off a pair of dentures, which we left safely ensconced. The Galapagos still hold many secrets.

This expedition was supported through the generosity of the Weiler Foundation. Permits and assistance were provided by the Galapagos National Park and the Charles Darwin Research Station.

Dr. Cohen is Chief Curator of Life Sciences at the Natural History Museum. He is a marine biologist.

Cochiti breadbowl made about 1860. Although this vessel was made over one hundred years ago, it remained in active use until recently. It survived because of the special treatment it received as a family heirloom. In recent years it was used only on festive occasions, when it was needed to mix and raise large batches of bread dough.



John De Leon

RECENT ACQUISITIONS

PUEBLO POTTERY

Fine pottery is a centuries-old tradition among the Pueblo peoples, who used vessels of fired clay for a wide range of domestic and religious purposes. Today, as in the past, Pueblo potters consider clay to be a sacred material. Their pottery is a major art form in the Pueblo cultures of Arizona and New Mexico.

Recent Acquisitions: Pueblo Pottery displays new additions to the Natural History Museum's collections of Pueblo ceramics. Most of the pieces exhibited come to the museum through the generosity of Betty and Ed Harrison.

The vessels in the exhibit span a period from 1800 to 1984. The oldest pieces in the exhibit are two large vessels from Cochiti. They are a storage jar, made about 1800, and a breadbowl, made about

1860. Vessels made in 1984 represent the ongoing ceramic traditions in four Pueblo cultures: San Ildefonso, Acoma, Zuni, and Hopi.

The exhibit features photographs of Severa Tafoya, who was an important Santa Clara potter. In 1939, Ed Harrison visited her and photographed her as she worked. She gave him a manufacturing sequence, consisting of raw materials, tools, and partly finished pots. In the display her gift is combined with the photographs to show how pottery was made at Santa Clara in 1939.

Recent Acquisitions: Pueblo Pottery is located opposite the south entrance on the first floor of the museum. The exhibit will continue until November 15, 1985.

—Margaret Ann Hardin
Associate Curator, Anthropology

Severa Tafoya making pottery, Santa Clara, 1939. The potter is building up a vessel by adding a coil. Finished pottery dries in the background.



Ed Harrison



Hopi vessels made by Priscilla Namingha (left) and her daughter Rachael Sahmie (right). As the great-granddaughter and the great-great-granddaughter of the brilliant innovator, Nampeyo of Hano, they continue a family tradition begun a century ago. The use of similar painted decorations on the two vessels shows how designs are handed down from generation to generation within the Nampeyo family.

Opposite page: Acoma fine-line seed jar by Linda Antonio, 1984. Acoma fine-line designs occurred as early as a century ago as a minor decorative element on small vessels. This seed jar illustrates the great complexity of twentieth-century fine-line designs. Linda Antonio is related to the Chino family, who were responsible for developing the contemporary Acoma fine-line style.

John De Leon





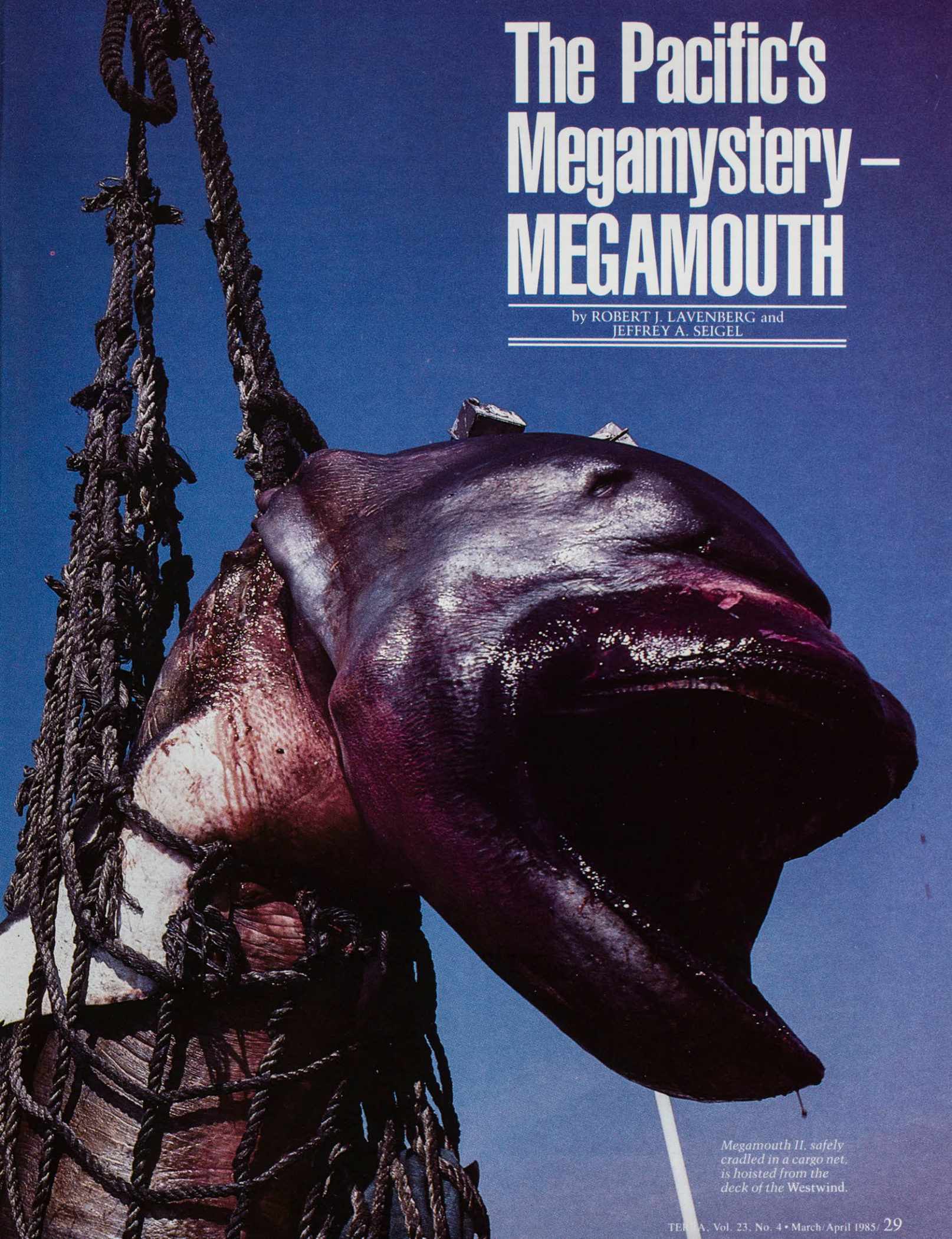
Ed Harrison

Severa Tafoya, with the help of her husband, smothers the pottery that she is firing. Both pottery and fuel are completely covered with powdered horse manure, which prevents oxygen from reaching the pottery. In this reducing atmosphere, the color of the pottery changes from red to black.



Small plates by Severa Tafoya, Santa Clara, 1939. The plate on the left is unfired. Grey clay is used to paint designs on its highly polished red surface. After firing, the negatively defined design appears as a shiny black flower against a matte black background.

John De Leon



The Pacific's Megamystery— MEGAMOUTH

by ROBERT J. LAVENBERG and
JEFFREY A. SEIGEL

*Megamouth II, safely
cradled in a cargo net,
is hoisted from the
deck of the Westwind.*

Sharks! The image of a large shark immediately conjures up all that is mysterious and fearsome. Sharks look menacing and their underslung jaw and torpedolike shape can inspire terror—sharks often are depicted in films and documentaries as huge brutal animals, white death, voracious man-eaters, and the ultimate predators.

Almost all the great sharks were discovered and described in the eighteenth and nineteenth centuries. Yet mysteriously a giant, pelagic, filter-feeding shark, harmless to man—*Megachasma pelagios*, commonly known as megamouth—has remained undetected until late in the twentieth century. The world's oceans have been extensively fished, but we had no clear idea that megamouth sharks existed until November 1976, when the first specimen was captured accidentally off the Hawaiian Islands by a naval vessel recovering torpedos.

The megamouth was apparently feeding on a shrimplike animal, a euphausiid, at around one hundred sixty meters deep. As the shark swam along with its huge mouth open, it ran afoul of a parachute that the naval vessel was using as a sea anchor. The parachute became entangled in the shark's mouth, and the small, sharp teeth on the edges of its jaws probably snagged on the parachute's fabric. When the sea anchor was recovered, so was the first megamouth shark; but, alas, it had suffocated.

This first megamouth was formally

introduced to science in 1983 in the Proceedings of the California Academy of Sciences. It was characterized at the time as having a bathtub-shaped lower jaw, an enormous short-snouted head, and numerous small vestigial teeth. (Small teeth found in Miocene and Oligocene deposits in California and Oregon have a structure and form similar to those of megamouth and are either remains of a megamouth or a fossil relative.) Megamouth has taken its place among the other giant sharks that reach lengths in excess of four meters, including the six-gill shark (*Hexanchus*), sleeper shark (*Somniosus*), whale shark (*Rhiniodon*), basking shark (*Cetorhinus*), white shark (*Carcharodon*), tiger shark (*Galeocerdo*), oceanic hammerhead (*Sphyrna*), and the threshers (*Alopias*).

Megamouth was a remarkable discovery and earned significant coverage in the broadcast and print media. At the time it was thought that because megamouth fed on shrimplike creatures of the deep scattering layer, somewhere between one hundred fifty and five hundred meters deep—its flabby body, soft fins, weak calcification of the skeleton, and asymmetrical caudal fin lacking keels seemingly adapted to these depths—future catches would be rare indeed.

For eight years no other megamouth shark was captured. Then, in the early morning hours of November 29, 1984, Vidal Torres, a California Department of Fish and Game observer on board the

fishing vessel *Helga*, which was fishing about fourteen kilometers off the east end of Santa Catalina Island, watched the retrieval of a gill net that had a strange-looking shark entangled in the meshes. The shark was still alive and was making feeble swimming motions in an attempt to escape. Vidal requested that a nearby research vessel come alongside to identify the shark. Dennis Bedford, a Fish and Game biologist, came aboard the *Helga*, recognized the rarity of the shark, and assisted in its recovery. The shark was pulled free from the gill net with a winch line from the research vessel *Westwind* and hoisted aboard for the trip to San Pedro. During the four and one-half hour trip, Dennis alerted officials in the Fish and Game offices, who subsequently called us at the museum.

Megamouth arrived at San Pedro at 10:05 a.m., and then the problems began. This was no small shark! Clearly the fish was more than four meters long and weighed in excess of six hundred kilograms. The original Hawaiian megamouth had been winched out of the water by the tail using a crane; in the process, the tail broke off, and the shark fell into the water, where it had to be retrieved by divers. To avoid breaking our shark's tail, we wrapped the specimen in a rope sling and hoisted it off the *Westwind* and into the back of a museum pickup truck. At the museum, Megamouth II was lashed with rope secured to a barred ground floor window, and the pickup was driven away, allowing the



John De Leon

The shark is pulled from a pickup truck to be measured, dissected, preserved, and displayed at the Natural History Museum.



Susan Gipson

The business end of Megamouth II. Note the rows of small, pointed teeth, large black tongue, and the highly reflective tissue lining the inside of the upper jaw.

Megamouth II is on display just opposite the first floor elevators.

shark to slide onto the pavement.

Although the shark had been successfully removed from the gill net, transported to the dock, and unloaded at the museum, our work had only just begun. Measurements, dissections, and tissue sample collections were made. For each effort an enormous amount of energy was required to move or adjust megamouth. We had seven hundred kilograms of ice brought in to cover the shark so that we could keep the shark fresh to comply with special requests from our colleagues and to protect it until preserved. After two days a temporary case was constructed in the parking lot so that the shark could be preserved for study and display.

One of our first and most obvious assessments of this catch is that megamouth does not have to remain in deep waters. The gill net that caught Megamouth II was set no deeper than 38 meters. Therefore, the shark had swum toward and nearly reached the surface before it became entangled in the net. If megamouth does indeed feed upon the shrimp-like euphausiids of the deep scattering layer, it could have slowly ascended with the layer and then accidentally swam into the soaking gill net near the

surface. Once in the gill net, the shark became entangled and could not escape.

Megamouth II is 4.5 meters long, two centimeters longer than Megamouth I. We could not accurately weigh the fish, but estimate that it weighs about seven hundred kilograms. Both Megamouth I and II are mature males. Megamouth II appeared to have recently spawned as it was "running ripe"; that is, spermatophores were oozing from the claspers (a male shark's copulatory organs) as the shark lay on the *Westwind's* deck.

Inside Megamouth II's intestinal tract we found large quantities of a purple, souplike liquid composed of fragments of euphausiids and copepods. The color appeared to come from the pancake sea jelly *Atolla vanhoeffeni*. The euphausiids and copepods could come from the deep scattering layer that sometimes approaches the surface, whereas the pancake sea jelly occurs at depths below one hundred fifty meters. Thus it could be that Megamouth II made vertical migrations between the surface and depths of one hundred fifty meters or deeper.

Megamouth II exhibits a pronounced counter-shaded color pattern, being dark gray-blue above and a silver-white below. These colors are typical of those fishes living in near-surface waters and act to camouflage the fish from predators. The question here is why does megamouth possess such a color pattern if it lives in the deep sea?

The mouth of megamouth is truly astounding. The lower jaw and tongue are

black, having the texture of velvet. The upper jaw and palate are markedly iridescent. Two large flaps of tissue are suspended from each side of the upper jaw. These flaps and the palate are heavily vascularized. Apparently when these sharks open their oversized jaws, the lower jaw disappears in blackness while the iridescent palate may attract megamouth's prey from the deep scattering layer. When the shark closes its mouth, the lateral flaps of tissue, the palate, and, mainly, the very muscular tongue keep the water containing its prey from escaping through the sides and front of its mouth. This forces the water through the pharynx with its closely packed gill-raker assembly, which gleans the euphausiids, copepods, or sea jellies from the water.

Megamouth is not a killer but a gentle giant of oceanic waters. None of these huge sharks have yet been observed by divers or fishermen, but should you encounter this fish while diving off Catalina or yachting around the Hawaiian Islands don't be surprised—call us here at the museum.

Robert J. Lavenberg is Curator of the Section of Ichthyology. His research interests focus on larval and adult shore fishes of the eastern Pacific Ocean. Jeffrey A. Seigel is Collection Manager in the Section of Ichthyology, and his research interests include sharks, Indo-Pacific shore fishes, and mid-water fishes.



Susan Gipson

Profile of a star—Megamouth II.



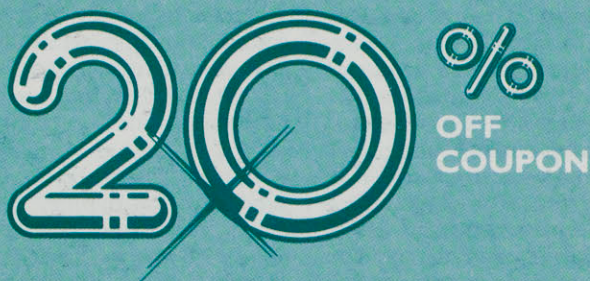
David Doubilet

Megamouth I, partly decomposed, being hosed off in Honolulu's Bishop Museum.



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